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INSTRUMENTS FOR THE MEASUREMENT OF HEIGHT, DIAMETER AND TAPER ON STANDING TREES

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THE object of this article is to survey briefly the instruments for the measurement of height, diameter and taper which have come into use during the past 25 years. The need for such a survey arises from the fact that the last reasonably comprehensive accounts of these instruments date back to the 1932 edition of Udo Müller's [52] textbook on forest mensuration and to Polanský's [55] series of articles on hypsometers which appeared in 1934; many of the instruments developed since then have only been described in journals with a limited local circulation, when they have been described at all. As a result it is difficult for foresters to find out just what instruments are available and what are their individual merits.

The present survey is necessarily incomplete because many promising instruments of local manufacture are not described in the literature and are likely to have escaped the writer's notice; and it has not always been possible to appraise the usefulness or otherwise of some of the instruments actually mentioned, partly from limitations of space and partly because much of the literature on the subject is somewhat uncritical, high claims for performance not being substantiated by adequate experimental evidence. In order to ensure that foresters have a reasonable chance of finding the instrument most appropriate for each specific purpose it would be necessary to test all available designs, but this is clearly beyond the means of most foresters and even of many research stations. There is room here, it would seem, for some international organization to take up the matter.

HEIGHT (*Hypsometers and height rods*)

In selecting an instrument for measuring the heights of trees the forester looks mainly for accuracy, speed and ease of handling, durability and low cost. Some of these desirable properties are conflicting, and the choice of an instrument for a given purpose will depend on which of these characters are rated the most important for that purpose.

The past 25 years have produced few new designs in hypsometers, but numerous modifications to existing patterns have been suggested in an endeavour to increase efficiency in respect of one or more of these characters without reducing efficiency in the others.

(*a*) *Instruments based on geometrical principles.*

These depend on the properties of similar triangles, and it is necessary to know either the distance to the tree or a measured height on the stem. From tests of accuracy that have been carried out by Petrini [54], Stoffels [65, 66, 67], de Koning [42] and von Wülfing [74], as well as from the writer's own experience, it appears that, other things being equal, instruments requiring the former measurement tend to give more accurate results than the latter because the measured distance is so much longer. On the other hand, the measurement of the distance from observer to tree is sometimes inconvenient and, if it is to be done accurately, it requires two people. Apart from such minor novelties as a Christen's hypsometer that folds [12] or is graded for staffs of 2, 4 and 5 m. [13], the main attempts at improving geometrical hypsometers have been centred on increasing the accuracy of the Christen type of hypsometer, which seems to be both the best and by far the most popular, and on adding range-finding attachments to hypsometers which would otherwise require measurement of the distance to the tree.

The precision instrument devised by Hümi in Switzerland [52, 55] on the principle of Christen's hypsometer, was later considerably refined by Knuchel [38] and Flury [18]. Another version has been produced by Lövengreen in Denmark [3]. Flury's model (Fig. 7) which is used for research purposes in Switzerland, is mounted on a tripod and provided with a small telescope; the hypsometer proper is attached to a rail along which it slides and it is kept in the vertical position by a weight. Similar instruments, but of a less refined finish, have been made by Holdsworth [29], Pospíšil [56], Polanský [55], Tozawa (quoted in [55]) and recently Tiwari [69] whose hypsometer has a range-finding attachment and can also read angles. In general it may be said that the more accurate these instruments have become, the more they have lost the great advantage of lightness and ease of handling for which Christen's hypsometer is renowned.

Improvements have also been suggested to the hypsometer of Vorkampff-Laue (quoted in [52]), which requires the measurement of a length on the tree equivalent to some pre-determined fraction of the total height. In order to obtain steadier readings Prey [57] suggests the use of a 3-m. pole with a groove in which the graduated rule slides up and down. Kohl [41] shows how an ordinary metal tape in a case can be used as a hypsometer of this type. The only requirement is sighting slits cut in the tape at 0, 27 and 30 cm. The end is held and the first 30 cm. are kept in a perpendicular position by the weight of the metal case and the remaining coil of tape inside it. For rough estimates Kohl considers it adequate to note the point on the tree sighted through the slit at 27 cm. and to measure the height to that point afterwards, instead of sighting on a graduated pole alongside the tree.

Of the geometrical instruments requiring the measurement of a base line, Weise's hypsometer is probably the best known. The Auto Simplex tree measure produced by a British firm is a recent version of it. Schober [63] has developed a Weise-type hypsometer with a range-finding attachment. Two horizontal stadia mounted on the instrument are brought into line (by moving an eye-piece) with two marks spaced 1 metre apart on a staff placed vertically against the tree. The distance is then read off the instrument. Polanský [55] suggests another type of range-finding attachment for the Weise hypsometer. It is a system of mirrors which produce two images of the trunk. By manipulation these images are moved into the position shown in Fig. 3. Further applications of this principle, which is by no means new, are found in the section on taper.

The use and adaptation of calipers and protractors as hypsometers has a long history [52, 4, 5]. In Holl's [30] protractor, if the horizontal distance to the tree is known, the height may be read direct from a graticule on the instrument, the lines of which form with the plumb-line a triangle similar to that formed by the observer's eye, the top of the tree and a point on it at eye level. Other hypsometers of the same general type have been constructed by Jurriaanse [34] and Drangel, whose instrument is described by Estberg [15]. Hudeczek [31] has modified Faustmann's hypsometer [52] in a way which enables it to be used for determining the horizontal distance to the tree when the oblique distance to the point at eye level is known.

(*b*) *Instruments based on the measurement of angles* (*trigonometrical instruments*).

Trigonometrical hypsometers are generally more accurate, more expensive and, with few exceptions, less cumbersome than geometrical hypsometers, but height cannot be read straight from the instrument, having to be calculated from the angle measured by the instrument and the distance to the tree. Depending on the formula used, this may be either the horizontal distance from observer's eye or the oblique distance from the eye to the foot or other specified point on the tree. Usually the height is determined with the help of tables, but it is perhaps more convenient and quicker to use a simple alignment chart such as that published by Roy [61] and now used by the Research Branch of the U.K. Forestry Commission. Trigonometrical hypsometers may have scales reading either angles in degrees, tangents or percentage slopes, i.e. the rise or fall per 100 units horizontal distance from the tree. Among the oldest, best known, and most useful, are the Abney Level and the Brandis hypsometer, which appears to be almost identical with the U.S. Forest Service Hypsometer. Probably the most efficient instrument of this type at present available is the 'Position Angle Finder' of the U.S. Navy. Spurr [64] describes it as 'decidedly superior to the Abney Level, the U.S. Forest Service Hypsometer and other devices for measuring the height of trees. The instrument is similar to the [U.S. Forest Service] hypsometer in principle, but is superior in that (i) the field of vision is extremely wide, (ii) angles up to 90° can be read easily and accurately, (iii) the graduated scale [in

degrees] is optically superimposed upon the field of vision, thus imposing no obstruction, and (iv) the weighted drum revolves in a liquid which effectively damps vibrations and fluctuations'. Stanley's Apomecometer is a simple instrument which also belongs to this group. It is similar to an optical square but reflects at 45° instead of at right angles. A sight is taken to the point on the tree level with the observer's eye. Then by walking forward or backward the position is found from which the top of the tree is seen by reflection in the Apomecometer simultaneously with that horizontal point. The usefulness of this instrument is clearly limited to conditions where an Abney Level or similar instrument could also be used at a fixed angle of 45°. Polanský [55] suggests that range-finding attachments similar to the one he describes for Weise's hypsometer, should be fixed to trigonometrical hypsometers. He also suggests having a whole series of height scales graduated in actual units of height, each for a specified distance from the tree; this would eliminate the calculation of heights from angles or tangents. It is not known, however, whether the designs suggested by him have ever been constructed and tested. More elaborate instruments which are mainly required for determining the diameter at various points on the stem, but which can also be used for measuring heights, will be discussed in the section on taper.

(*c*) *Height rods.*

With trees of limited height, rods tend to give the height more accurately than hypsometers that could be handled with equal speed, but on trees over 40 to 50 ft. high this advantage rapidly disappears, although rods are sometimes used up to 70 ft. Hetzel [27] specifies the chief requirements of height rods to be 'lightness, portability, ease and speed of operation, strength and rigidity, and cheapness of construction'. His rods consist of four 8-ft. sections held by clamps. Two of the sections are of Yellow Poplar and the other two of Hard Maple, the total weight being 18 lb. It is more usual to use a number of 5- or 6-ft. sections made of Bamboo or other light wood, with metal ends and sockets. The Research Branch of the U.K. Forestry Commission has used rods of this type for over 20 years in permanent-sample-plot work. Each set has ten 5-ft. sections, the whole weighing about 15 lb. Kienholz [37] describes a set of rods, each 6 ft. long, 1½ in. in diameter, and octagonal in cross section, which he has used up to 70 ft., while Osborne [53] simply spliced three ordinary Bamboo fishing poles with baling wire, giving a total length of 35 to 40 ft. McNeill [48] designed a 3-section telescopic pole made of wood, with an extended length of 48 ft. and weighing 27 lb. This seems to be an idea worth following up. It should be possible to produce a lighter, more compact and yet more rigid telescopic pole out of light metal.

In order to get the top of the measuring rod more accurately level with the top of the tree, Liming [45] attached a coil spring ⅜ in. in diameter, 4 in. long and with a cluster of four white feathers in the free end, at right angles to the upper end of the top section. The spring and feathers are said to be no hindrance in moving the pole along the trunk of the tree.

Diameter at Breast Height

One of the forester's main objects in measuring the girth or diameter of the tree at breast height is to calculate its basal area, and this is usually done on the assumption that the tree is circular in section. On trees which are not truly circular, and they are probably in a majority, basal areas calculated from girth measurements will differ from those derived from diameter measurements, and the difference will tend to increase with the degree of excentricity of the stem. The respective merits of girth and diameter measurements were thoroughly examined from a theoretical standpoint by Chaturvedi [11], whose conclusions were confirmed experimentally by Mahendru [47]. These conclusions were that tape measurements always give over-estimates of basal area while caliper measurements may produce positive or negative errors, but that tape measurements are to be preferred for estimates of increment because they are more consistent, measurements carried out by different people on the same trees giving more nearly identical results than in the case of calipers. Robertson [60] endorses Chaturvedi's conclusions in a brief review of the case of tape versus caliper in which he also quotes other authorities. Practical disadvantages of calipers are that they tend to get out of adjustment, a fault which is readily rectified only on the more expensive models, and that they are less portable than tapes. The practice of using tapes in the permanent-sample-plot work of the British Forestry Commission is said to date from the first World War, when many sample plots were measured by women who found prolonged

work with calipers too strenuous. Another disadvantage of calipers is that they cannot be used on trees above the maximum size for which they are designed. On the other hand, calipering is generally claimed to be faster than taping if only one diameter on each tree is measured, and it is much more convenient for measuring felled trees.

It appears that in most countries the choice between tape and caliper is based on custom rather than on reason. Where foresters are accustomed to think in terms of girth they tend to use tapes. Where they think in terms of diameter they lean to calipers, but there is no need for this, because tapes can be graduated in units of diameter and calipers in units of girth. Perhaps the most satisfactory method is to use diameter tapes, because they combine the advantages of girth measurement with those of working with diameters; the latter enable more direct comparisons to be made with data from ring counts, stem analyses etc., and they are often more convenient for utilization purposes.

Little need be said about tapes. The most useful for many purposes, but also the most expensive, are metal tapes in a case with an automatic spring return. Good designs are produced in many countries.

The standard type of caliper consists of a rule to which are attached at right angles one movable and one fixed arm. The qualities to look for in a caliper are durability, accuracy, lightness, ease of movement of the movable arm, a device for adjusting the movable arm when it gets out of alignment, grips of leather or other material comfortable to hold in cold weather, and a suitably marked scale on the rule. These properties are perhaps best realized in Flury's caliper described by Knuchel [39], which is also one of the most expensive. The rule of this precision instrument is of Pear wood lined with brass, the arms are of duraluminium, the grips are covered with leather, there is an ingenious device which enables the movable arm to slide freely along the rule without introducing any inaccuracy, and an adjusting screw is provided in case the movable arm should get out of alignment through prolonged wear. The scale is in black on white celluloid and the numbers are all of the same size. This feature may appear to be unimportant, but Knuchel [40] has shown that the type of numbering may lead to error. Thus when some numbers such as 10, 20, 30 are printed larger than the intervening ones, they tend to be called more often than they should. Flury's caliper is used mainly for research work in Switzerland and India. Between the extremes of the Flury caliper and the simplest wooden calipers there is quite a variety of good patterns made by firms in Switzerland, France, Sweden, Germany, Austria, and other countries where calipers are in common use, but comparatively few of these appear to have been described in forestry literature [28, 50].

Some calipers have unusual features. Gehrhardt [20] designed a precision caliper which enables two diameters to be read simultaneously at an exact right angle. Japing [33] describes a model which is scaled on the back, a feature which he claims facilitates readings, and so built that one man can do both the measuring and the recording. A spring device allows of its being adjusted to the tree with one hand and left there without the operator holding it at all. A special precision caliper for use in Bamboo forests is described by Tiwari [70]. Hohenadl designed a caliper which automatically registers trees by girth classes. A German firm is now producing a further refinement to this type of caliper, whereby four different species can be differentiated. A mechanism built into the caliper punches a paper strip every time the caliper is pressed against the tree. From these punched strips the results of the calipering can subsequently be tabulated mechanically. If this instrument proves reliable and reasonably easy to handle, it will be invaluable in eliminating all the errors—and expense—of human recording.

On trees with small diameters, fixed-arm calipers such as tree forks are quicker to operate than ordinary calipers, they do not get out of adjustment and they may be used with one hand only, leaving the other free for other work, but they are usually less accurate. Ferguson [16] constructed a simple fork for use in regeneration in Mangrove and swamp forests, where it is a question of getting an approximate measurement of a large number of stems under 40 cm. in diameter in the shortest possible time. Under these conditions he considered the fork preferable to tape, Biltmore stick or caliper. The prongs of the fork are 60 cm. long, set at an angle of 60°, and have a convenient wooden handle at their junction. The diameter graduations are on the prongs of the fork and the reading is taken at the point of contact with the stem. In a trial on 40 trees, the total basal area determined with the fork was between the basal area measured with a caliper and that measured with a tape. A more elaborate tree fork which automatically registers the number of trees measured is described by Eriksson [14]. The counting mechanism is inserted near the junction of the prongs

and operated by a metal arm which is depressed every time the prongs engage the tree (Fig. 8). In very irregular stands of Pine this fork gave diameter errors up to 6%, but in more uniform stands of Spruce, errors were usually less than 1%. Wiljamaa [71] and Ilvessalo [32] describe an instrument in which one prong is straight and the other curved (Fig. 4). This instrument is said to be popular in Finland, where foresters often attach a stick to it in order to ensure an accurate determination of breast height. For diameters up to 12 in. it was found to be almost as accurate as calipers, provided that diameters were recorded only to the nearest inch. Of 48 trees tested, 42 agreed, 4 were borderline cases and 2 were thrown into the wrong inch class.

Šušteršič's [68] caliper, which is used in Slovenia, is like an ordinary caliper, but with only the fixed arm and no movable arm. The fixed arm and the rule are pressed against the tree in the usual manner and the diameter is read off the rule at the estimated point where, in an ordinary caliper, the movable arm would join the rule when pressed against the tree. The operator holds the instrument by a handle 1·3 m. long, fixed to the caliper at the point of balance. The diameter range of this instrument is greater than that of most fixed-arm calipers.

The types of tree compasses described in the older textbooks (e.g. Fig. 13) for the measurement of diameters, are scarcely ever used in practice because they may give rise to very serious errors. Pullirsch [58], however, describes a compass-type instrument devised by Ulrich which is said to avoid these disadvantages and be very light and easy to handle (Fig. 14).

In the U.S.A., as well as in some other countries, the Biltmore stick has become a popular substitute for calipers in timber cruising. Its main advantages are speed and ease of operation, but it is not sufficiently accurate for precision work, and it must be considered as an aid to ocular estimation rather than as a measuring instrument. The underlying principles and instructions for graduating Biltmore sticks are given by Chapman and Demeritt [10] and by Bruce and Schumacher [8]. Various refinements have been suggested from time to time, such as the use of a folding rule or rigid diameter tape in place of a stick [22, 26, 49].

An ingenious and rapid method ('Winkelzahl') of obtaining the basal area per unit area when no knowledge of the diameters of individual trees is required, was recently developed by Bitterlich [6] and tested in the field by Keen [36]. All that is required is a rod 65·4 cm. long with a 1-cm.-wide cross-piece at one end, while the opposite end is held to the eye (Fig. 6). From a point within a stand, the observer sights the instrument at each stem in a complete circle around him, counting all those stems which at breast height subtend a larger angle at the eye than the cross-piece, and ignoring all stems that are smaller. The basal area per acre in square feet hoppus measure is twice the number of stems thus counted. If the basal area is wanted in metric units, a 1-m. rod with a 2-cm. cross-piece gives a count in which the number of stems equals the basal area in sq. m. per hectare. The underlying theory is simple and is described in the papers quoted above. A refinement devised by Bitterlich [7], the "Relascope" (Fig. 5), makes the readings independent of slope. In even-aged stands of conifers Keen found that 15 to 17 circular sweeps, as the stem counts are called, from different points in a stand, gave basal area estimates of similar precision to the girthing of 14 circular $\frac{1}{10}$-acre plots, and in less than half the time required for the girthing. Bitterlich's method is, however, clearly inapplicable to precision work or for determining the diameter-class distribution in a stand.

Taper

In order to determine the taper of a tree, it is necessary to measure the diameter at one or more specified points along the stem as well as at breast height, the number of points of measurement being dependent upon the nature of investigation.

There are three main lines of approach to this problem. The first is to climb the tree to the points of measurement, the second is to raise a caliper or tape to the points by means of a pole, and the third is to use optical devices to determine the diameters from a distance.

(*a*) *Climbing equipment.*

For precision work, climbing, although laborious, perhaps offers the most satisfactory solution. Several types of sectional ladder made of light metal have been developed in Sweden, one of which is used by the Forestry Commission in Great Britain for the measurement of sample trees in permanent sample plots. On straight boles that are free of branches it is relatively easy to join four or five 10-ft.

sections, and it is claimed that for seed collection on *élite* trees in Sweden, ladders have been joined to a total length of 100 ft.

On crooked stems and stems with very large diameters it is difficult to secure the chain which holds the ladder against the tree, while branches interfere with getting the sections into position. On the other hand, when there are too many branches for mounting additional sections, it is usually possible to climb without the aid of a ladder. Climbing irons are not commonly used in mensurational work because of the risk of damaging the cambium. There is, however, an ingenious Swiss climbing device [1] called the 'Baumvelo' or tree bicycle [Figs. 11 and 11a) to which this objection does not apply. It can, however, only be used on reasonably clear stems.

(*b*) *Pole calipers and similar devices.*

These devices have come into use where a single diameter at a limited and predetermined distance above breast height is required in connexion with the application of form-class volume tables. The jaws of the caliper, which is mounted on a pole, are opened and closed by means of cords. In some models a spring holds the movable arm in the closed position, in others in the open position, while the simpler designs have no such spring at all. Geete [19] describes several models and gives the history of their development in Sweden, where they are probably more widely used than elsewhere. According to Geete, Ullén's caliper, which dates from 1931, is perhaps the best known and most recommended. A sturdy instrument made of spring steel, it can be had with a scale in inches (up to 16) or cm. (up to 40). The movable arm is normally held in the closed position by a spring. Ferree [17] describes a simple pole caliper used at the Northeastern Forest Experiment Station in the U.S.A. This model, which has no spring to hold the movable jaw, was designed to determine the top diameter of the first 16-ft. log.

The use of pole tapes appears to be a more recent and less common development. Goodman's [21] consists of a 14½-ft. length of conduit tubing with an ordinary diameter tape mounted to run inside it. The tape has a wire with a hook on the end for the actual measurement. The operator catches the hook in the bark, walks round the tree and, through an opening in the tubing, reads the diameter directly from the tape. Von Wülfing [73] has shown how a Biltmore stick mounted on a pole was used to good advantage in the Dutch East Indies. Tree forks [19] have also been mounted on poles. These low-precision devices serve a useful purpose within a very restricted set of conditions. The experienced timber cruiser will estimate taper as accurately by eye without their aid and the novice may get misleading results unless he has learnt to use them correctly and realizes their limitations. The R.A.C. quarter-girth bar [44], mounted on a pole and with the quarter-girth classes indicated by different colours, also belongs to this category.

(*c*) *Dendrometers.*

The construction of optical instruments for determining diameters at heights which cannot conveniently be reached from the ground has long been attempted by foresters, and quite a number of dendrometers, as these instruments are specifically called, have been designed, many of which have eventually found their way to unobtrusive corners in forestry museums. Apart from the unavoidably high cost of any optical instrument, the bulk and slowness of handling preclude the use of most existing models except for precision work, for which direct measurements obtained with the help of modern climbing equipment are often considered preferable. Additional difficulties experienced with optical instruments are that they cannot easily be read accurately when light conditions are poor, as is often the case in dense stands, or when the stems to be measured sway in the wind; strenuous efforts, however, continue to be made in various countries to overcome these difficulties.

As Liljenström's dendrometer is perhaps the best known, the brief English description of it by Winters [72] is quoted in full. 'This dendrometer is a telescopic instrument, mounted on a tripod, and equipped with a level, a vertical arc, and a scale etched in glass in the eye-piece to perform a function similar to that of the stadia hairs in a transit. It is set up at a known distance from a given tree and levelled in the usual fashion. To determine the height of the tree a sight is first made on its base and the vertical [plane] angle read in degrees. A sight is then made on the tip of the tree and the reading on the vertical scale again noted. These angular units are converted into tree heights from two sets of tables, one in metric and one in English units, covering distances from the tree of 10 to

25 metres. The diameter at any point is determined by reading on a graduated scale in the telescope of the dendrometer the number of graduations between the two outer edges of bark on the trunk and multiplying this number by the proper factor as shown in the tables for the given distance and vertical arc reading.' Winters, who used the instrument in order to obtain data for preparing a volume table for Black Walnut, came to the conclusion that, compared with climbing, the errors to which the dendrometer may give rise more than counterbalance its greater speed of operation, and its use was discontinued. In Scandinavia and Central Europe, however, the instrument appears to have been considered more useful [25, 59].

Lönnroth's dendrometer [46] (Fig. 9) is a telescope which must be used at a horizontal distance of either 8 or 12 m. from the stem. In the field of view there are two vertical marks with which the contour of the stem is made to coincide by adjusting the length of the telescope. Along its side are two scales, one for a horizontal distance of 8 m. and the other for 12 m. The diameter readings, which are taken direct from the appropriate scales, are independent of the angle of elevation because the necessary adjustment is effected by a pendulum attached to the end of the telescope and coupled with the optical system. This pendulum also forms part of a clinometer which enables the angle of elevation to be read. The main advantages claimed for this dendrometer are that it requires no tripod and that diameters are read direct; the main disadvantage, that it must be used at a specified distance from the tree. No references to any field tests with this instrument were discovered in the literature surveyed.

Korsuň [43] describes a dendrometer which is said to combine the advantages of Klaussner's and Hossfeld's instruments (quoted in [55]). The essential features are three metal scales forming a modified Klaussner's hypsometer, and a telescope mounted on one of the scales and provided with a transparent micrometer scale for taking diameter measurements at any desired stem height. This instrument is claimed to save 30% in working time as compared with Liljenström's dendrometer. The Sylvimètre Système Crance described by Schmitz and Favresse [62] also appears to be a development of Klaussner's dendrometer. It measures heights and diameters direct at fixed distances of 6 and 12 m. from the tree. Kadambi's Unimeter [35] is a multipurpose instrument, which was designed with the object of providing the forester and plane-tabler in India with a simple and sturdy instrument combining the functions of a dendrometer, cross-staff, and right-angle prism; it is thus of use not only in forest mensuration but also in surveying. It consists of three main parts termed 'anchor', 'pedestal', and 'tripod'. For measuring tree heights the anchor may be used detached from the tripod. The height scale is graduated in degrees, tangents and percentages. Although no details of actual tests in the field are available this instrument sounds promising and may prove useful to tropical forest services in other parts of the world.

Hartman [23] produced an instrument consisting of two separate optical systems, each using the principle of stadia, the one to find a specified height on the stem (17·5 ft.), the other to give the diameter at that point from a specified distance (25 ft.) from the tree. The object is to allow a rapid form-class diameter measurement at the top of the first 16-ft. log. Ordinary binoculars with a mil scale in the eye-piece have also been used successfully for rough form-class determinations and more particularly for training timber cruisers in the ocular estimation of taper [9].

Heikkila's [24] mirror dendrometer (Fig. 10) consists of a system of mirrors in a metal case. The principle is similar to that of the range-finding attachment suggested by Polanský [55] for the Weise hypsometer, but Heikkila's instrument gives the diameter from a known range instead of the range from the diameter.

The Research Branch of the U.K. Forestry Commission has recently tried a Barr and Stroud range-finder with an 8-in. base (b) as a dendrometer (Fig. 12). The principle of this instrument also depends on the lateral displacement of images, but it enables both range and diameter to be determined. When the images coincide (Fig. 1), the range (R) to the point of measurement is read straight off the range dial. When the displacement of the images equals the diameter (Fig. 3), the range dial is again read (r). From the range (R) and the difference between (R) and (r), the diameter (d) is calculated from the equation:—

$$d = \frac{b\,(R - r)}{r}$$

The underlying theory is evident from Fig. 2.

The instrument weighs 4½ lb. and can be used without a tripod for determining diameters, but for measuring heights, the far heavier tripod is essential. Under favourable light conditions, diameters can be read to the nearest $\frac{1}{10}$ in. at a range of 40 m., and heights, judging by limited tests, slightly more accurately than with an Abney Level. It shares with Heikkila's mirror dendrometer the advantage that neither the movement of trees in the wind nor the unsteadiness of the observer when not using a tripod, affects the diameter readings as much as in the telescopic instruments, and it is superior to other types in that it reads the range to the point of measurement direct and with great accuracy. An attempt is being made to construct a model on which diameters can be read direct, and heights without a tripod. The possibilities of another novel dendrometer design are also being studied by the U.K. Forestry Commission.

Bitterlich's [7] Relascope (Fig. 5) is not strictly comparable with the other dendrometers, because actual diameters are not obtained with it, but it must be mentioned among the instruments used for measuring taper because it gives estimates of the form height and of the standing volume by determining the point on the stem at which the diameter is equal to ½ breast-height diameter (d.b.h.) and also the height to that point. The form height is obtained by dividing the reading on the instrument by the d.b.h.; and the volume by multiplying the cube of d.b.h. by the reading given on another scale. The instrument is based on a volume formula by Pressler [quoted in 52] which is fairly accurate for almost any type of stem free from severe deformities. In actual trials with the prototype of this instrument, the variation coefficient of individual volume estimates was approximately 12%, which does not compare unfavourably with the precision achieved by applying general volume tables [36]. The Relascope in its present form is unsuitable for precision work, but it may prove useful in large-scale enumerations where speed and ease of handling are more important than the accuracy of individual measurements. It is understood that Bitterlich is now producing a multipurpose instrument which will superimpose upon the optical system of a range-finder the essential features of his Relascope.

Looking to the future, there is nothing to indicate that the instruments for the measurement of height and diameter at breast height will be very different in 25 years from what they are now, and have been for the last half century. With dendrometers (*sensu stricto*) the position is different. There is a growing demand for something better than we have, and, as has been shown above, serious efforts are being made to meet this demand. Some measure of success may confidently be expected.

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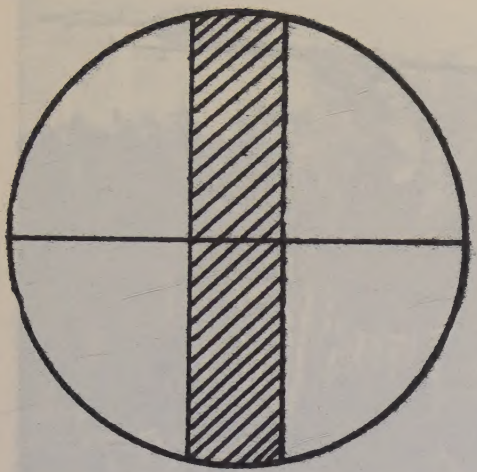


Fig. 1. Coincident stems; Barr and Stroud range-finder.

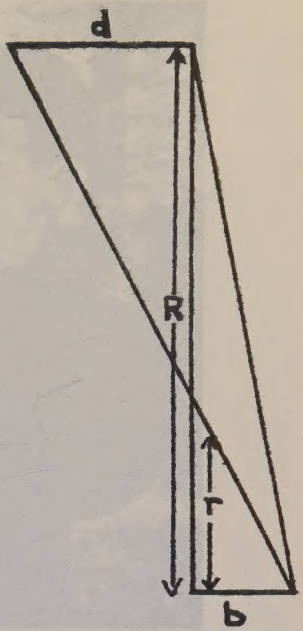


Fig. 2. Principle of the Barr and Stroud range-finder.

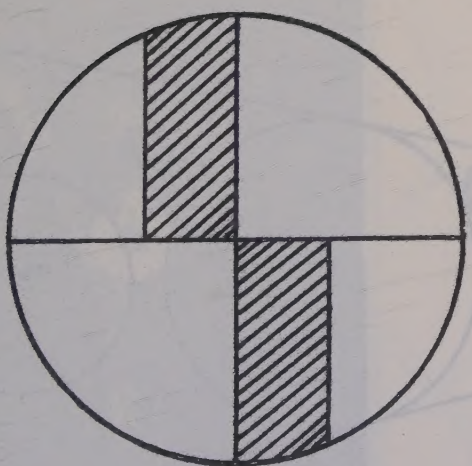


Fig. 3. One-diameter displacement of stem images; Barr and Stroud, and Polansky range-finders.

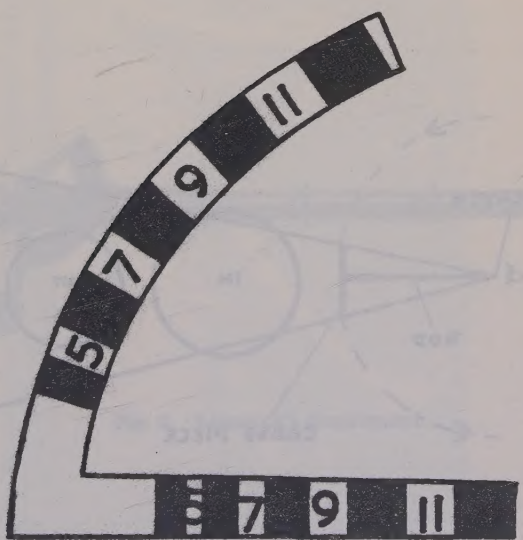


Fig. 4. Fixed-arm caliper described by Wiljamaa [71] and Ilvessalo [32].

Fig. 5. The Relascope.

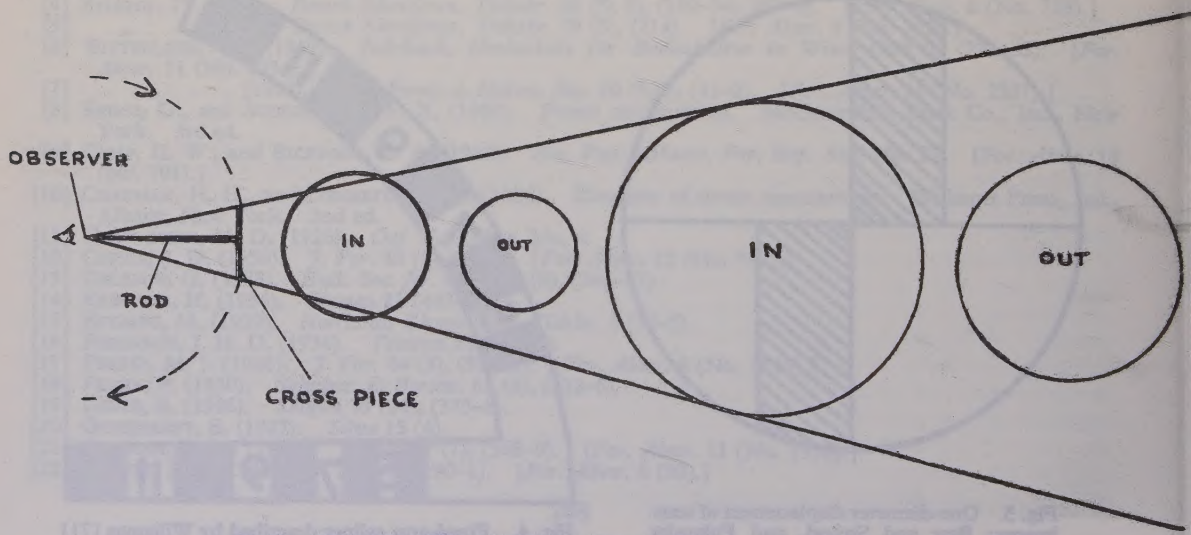


Fig. 6. Bitterlich's 'Winkelzahl' sighting rod, sighted on trees (diagrammatic).

Fig. 7. Flury's hypsometer.

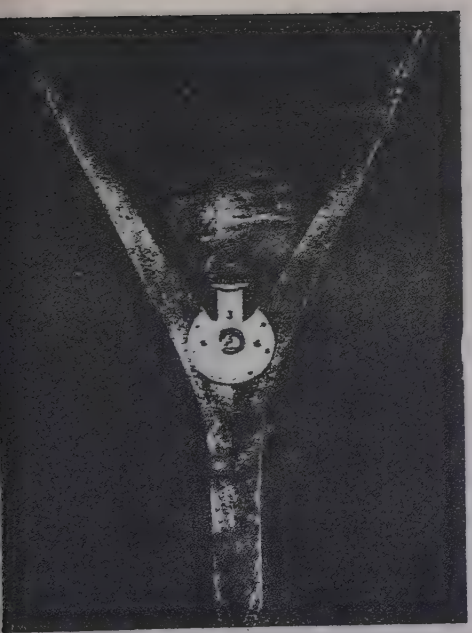
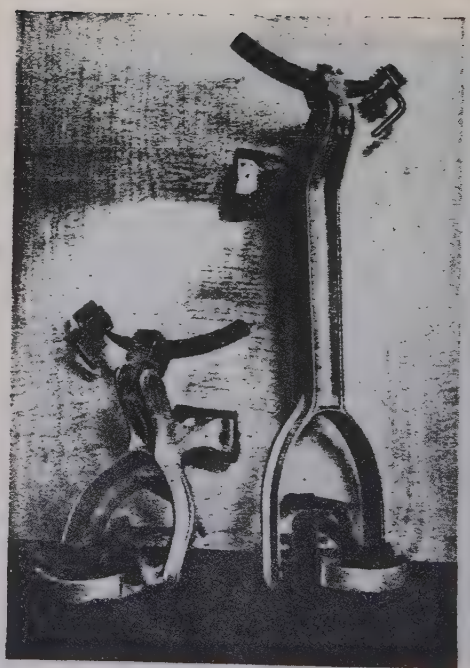


Fig. 8. Eriksson's fork.

Fig. 9. Lönnroth's dendrometer.

Fig. 10. Heikkila's mirror dendrometer.



Figs. 11 and 11a. The 'Baumvelo' or 'Tree Bicycle'.

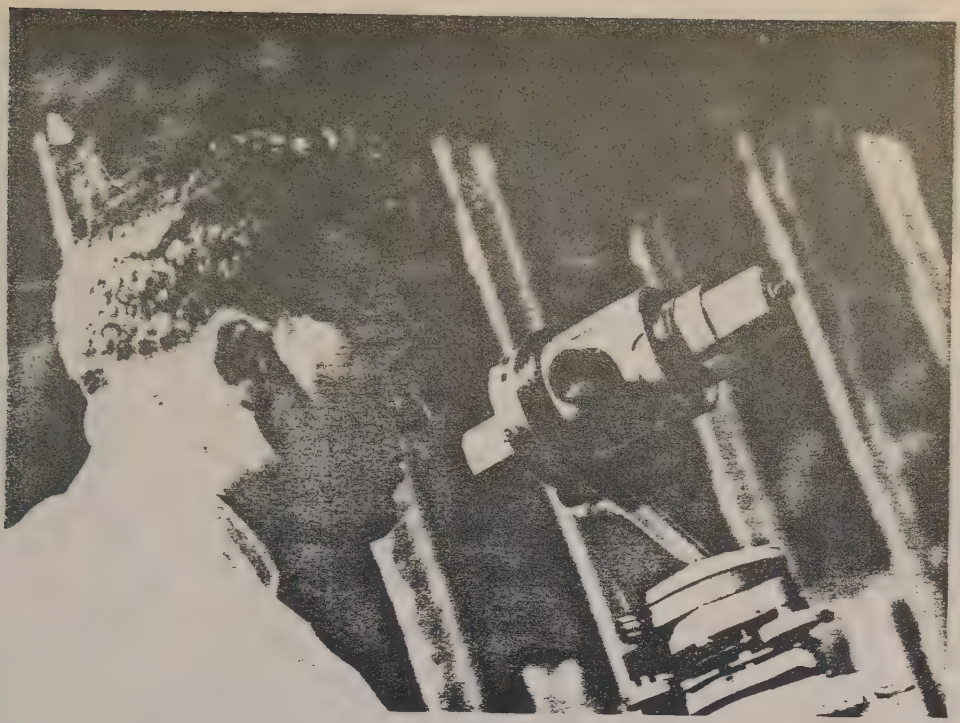


Fig. 12. Barr and Stroud range-finder.

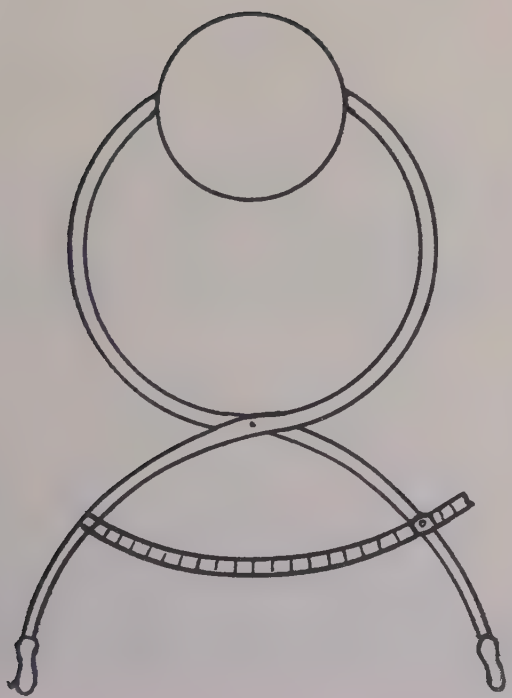


Fig. 13. Old-style tree compass.

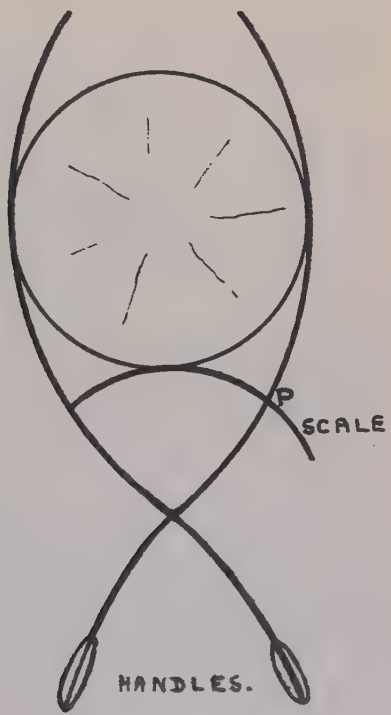
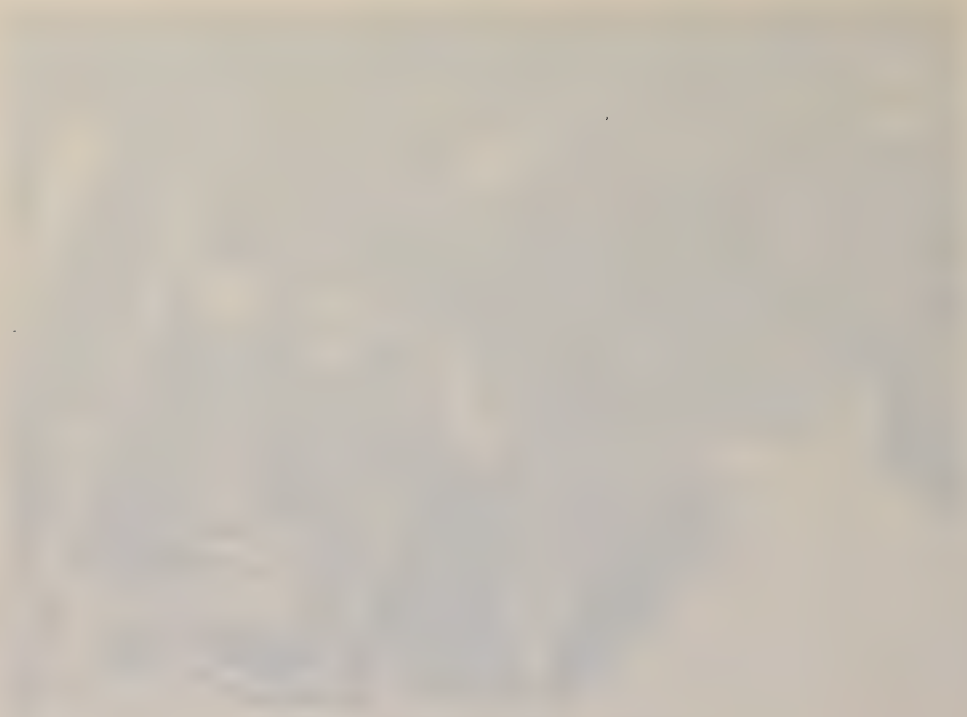
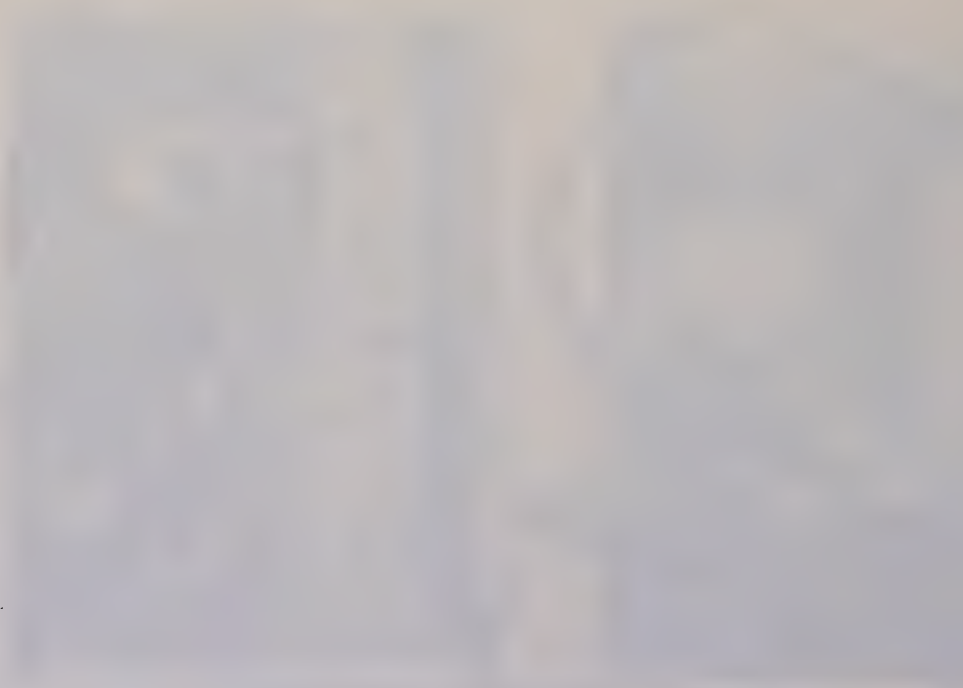


Fig. 14. Modern tree compass; after Ulrich.





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ABSTRACT SECTION

0. GENERAL FORESTRY

01. TERMINOLOGY. NOMENCLATURE. BIBLIOGRAPHY. MATHEMATICAL AND STATISTICAL ANALYSIS

See also *For. Abstr.* 12
(Nos. 1798, 1849, 1997, 2013, 2021, 2065, 2123, 2153, 2161, 2484, 2530).

1658. **Oxford system of decimal classification for forestry.** With introductory note. Commonwealth Forestry Bureau, Oxford. 1950. 76 + x.

The definitive text (in mimeograph), with an introductory note, as approved by the Joint Bibliographical Committee of FAO and the International Union of Forest Research Organizations in Sept. 1950. An alphabetical index to the system has been compiled at the C.F.B., Oxford.

1659. **Publications of the Tropical Forest Experiment Station, October 1939 through January 1950.** U.S. trop. For. Exp. Sta. 1950. pp. 10.

A list of all published work of members of the staff of the station since its inception; arranged chronologically within broad subject divisions.

1660. **Regional Planning Bibliography, Supplementary Volume: Bibliography on Australia's vegetation, forestry and timber resources.** Commonwealth Forestry and Timber Bureau, Canberra. 1948. pp. 45.

Separate sections are devoted to the various states.

1661. Boyd, H. **White Oak (*Quercus alba* L.) bibliography.** Sth. For. Exp. Sta. 1949. pp. 13.

Arranged alphabetically by author within broad subject divisions.

02. TEXTBOOKS. DICTIONARIES. LISTS OF VERNACULAR NAMES

See also *For. Abstr.* 12
(Nos. 1795, 1810, 1999, 2271).

1662. Rubner, K. Neudammer forstliches Lehrbuch. Lieferung 1, 2. **[Neudamm textbook of forestry. Pts. 1 and 2.]** Neumann Verlag, Radebeul and Berlin. 10th ed., 1948. pp. 352.

With sections contributed by other authors, the whole being compiled from German sources of reference.

1663. Edlin, H. L. **The Gaelic alphabet of tree names.** *Scot. For.* 4 (3), 1950 (72–5). 2 refs.

Elucidates the names of the roman letters in (Scots and Irish) Gaelic, all of which are the names of trees or shrubs.

05. PERIODICALS. ANNUAL REPORTS

See also *For. Abstr.* 12
(Nos. 1689, 1696–9).

1664. Jacobs, K. [Compiler]. **List of serials currently received in the Library of the United States Department of Agriculture, November 1, 1949.** *Bibliogr. Bull. U.S. Dep. Agric.* No. 12, 1950. pp. 349.

1665. Revue internationale du Bois. **International Timber Magazine.** Services techniques et commerciaux, 98 Blvd. Malesherbes, Paris 17e. No. 157, 1950. pp. 32. [F.E.]

Starting with this number, the *Revue internationale du Bois* is to appear with French and English versions in parallel columns.

1666. Table générale des matières de la Revue des Eaux et Forêts, années 1928–1948, tomes 66 à 86. **[Consolidated indexes to the *Revue des Eaux et Forêts*, vols. 66–86, 1928–48.]** Revue forestière française, Nancy. 1950. pp. 89. [F.]

Includes (1) alphabetical subject index, (2) alphabetical author index, (3) chronological table of official acts, ordinances etc., and (4) chronological table of legal proceedings and judgments reported.

1667. **Annual review of plant physiology.** Annual Reviews, Inc., Stanford, Calif. No. 1, 1950. pp. x + 364. Many refs. Price $6.00 (48*s.*).

Several important phases of plant physiology have hitherto been reviewed at regular intervals in the *Annual Review of Biochemistry*, but it has now been decided to devote a separate

review to the subject. The first volume, that for 1950, includes the following review articles:– Mineral nutrition of plants (*E. G. Mulder*); Carbon-dioxide fixation by green plants (*A. A. Benson* and *M. Calvin*); Influence of light on plant growth (*M. W. Parker* and *H. A. Borthwick*); Plant tropisms (*A. R. Schrank*); Organic acid metabolism (*K. V. Thimann* and *W. D. Bonner Jr.*); Transformation of sugar in plants (*W. Z. Hassid* and *E. W. Putman*); Growth regulating substances in horticulture (*J. W. Mitchell* and *P. C. Marth*); Herbicides (*A. G. Norman, C. E. Minarik* and *R. L. Weintraub*); Physiology of cell wall growth (*A. Frey-Wyssling*); Post-harvest physiology and biochemistry of fruits (*J. B. Biale*); Respiration of higher plants (*D. R. Goddard* and *B. J. D. Meeuse*); The nitrogenous constituents of plants with special reference to chromatographic methods (*F. C. Steward* and *J. F. Thompson*); Water relations of plant cells and tissues (*P. J. Kramer* and *H. B. Currier*); Soil moisture in relation to plant growth (*F. J. Veihmeyer* and *A. H. Hendrickson*); Soil chemistry in relation to inorganic nutrition of plants (*P. R. Stout* and *R. Overstreet*).

1668. **Annual report on forest research in the province of West Bengal for the year 1947–48.** West Bengal Government Press, Alipore. 1949. pp. 34.

Consequent on the partition of Bengal, the Chittagong Hill Tracts, the Dacca-Mymensingh and the greater part of the Sundarbans Forest Division were transferred to Pakistan on 15 August 1948. After the partition, the activities of the Silvicultural Division were extended to the dry and highly eroded western belt bordering Bihar and Orissa. A list of the silvicultural plots that passed to Eastern Pakistan as a result of the partition of Bengal is given in one of the appendixes.

1669. EDWARDS, J. P. **Report on federal forest administration in the federation of Malaya for the year 1949.** Government Press, Kuala Lumpur. 1950. pp. 68 + 6 photos, 1 map. Price $2.00 (4*s.* 8*d.*)

1670. DANSEREAU, P. Rapport des travaux du Service de Biogéographie pour les années 1943–49. **[Report on the work of the Biogeographical Service for the years 1943–49.]** *Bulletin du Service de Biogéographie, Montréal* No. 6, 1950. pp. 35. [F.] [University of Montreal.]

A report on the objects of the Service, which was formed in 1943 by the Provincial Secretariat of Quebec, its projects and achievements.

06. SOCIETIES. CONFERENCES. PROPAGANDA

See also *For. Abstr.* 12 (Nos. 1993, 2032, 2291, 2534).

1671. GARDNER, R. C. B. **The Royal Forestry Society of England and Wales.** *Brit. agric. Bull.* 2 (8), 1949/50 (423–7). O.R.E.

A short account of the Society and its activities.

1672. Det Norske Skogselskap gjennom 50 år. I: Det Norske Skogselskap. Fylkeskogselskapene. Vestlandets Forstlige Forsøksstasjon. II: Norsk skogbruk fram til idag. **[The Norwegian Forestry Society through 50 years. I: The Norwegian Forestry Society. County Forestry Societies. The Vestland Forest Research Station. II: Norwegian forestry up to the present day.]** Det Norske Skogselskap, Oslo. 2 vols. 1949. I pp. 416; II pp. 297. [Nor.]

A memorial work issued for the 50th anniversary of the Society. Vol. I deals with Society matters and the history and activities of the institutions named. Vol. II is a symposium of papers by experts on all major aspects of forestry in Norway, written in semi-popular style.

1673. HADDINGTON, LORD. **The Danish Heath Society.** *Scot. For.* 4 (3), 1950 (65–71).

An account of the society and its work, with general remarks on forests and forestry in Denmark. [Cf. *For. Abstr.* 12 (Nos. 1698–9, 1706–7).]

1674. **The Filipino Forester: Proceedings of the first annual meeting of the Society of Filipino Foresters, January 9, 1949, Manila, Philippines.** 1, 1949 (1950), pp. 78.

1675. TAMESIS, F. **Report on the International Conference on Forestry and Timber Utilization for Asia and the Pacific [Mysore, 28 March–8 April 1949].** *Philipp. J. For.* 6 (2), 1950 (115–98).

Cf. *For. Abstr.* 11 (Nos. 1570–1). Includes the recommendations of the conference and reports on Philippine forest policy.

1676. **Agricultural genetics: Conference at Rieti [30 May–3 June, 1950].** *Nature, Lond.* 166 (4216), 1950 (292–4).

A summary of papers and discussions. Subjects included breeding of fruit and Olive trees.

1677. VESTERINEN, E. Suomen Metsäyhdistyksen Metsätaloudellisen Valistustoimiston toimintakertomus vuodelta 1949. [**Annual report for 1949 of the Forestry Promotion Office of the Finnish Forest Union.**] *Metsät. Aikak.* 1950 (1), (12–5). [Fi.e.]

The varied activities and achievements of this Office since its establishment in 1927, are given in some detail, as also its organization and financing.

07. EDUCATION AND RESEARCH. ARBORETA. EXPERIMENTAL FORESTS

See also *For. Abstr.* 12 (Nos. 1668, 1725, 1852, 1994–6, 2032, 2534).

1678. **Colonial forestry courses: facilities available for colonial students.** *Commonwealth Survey, London* No. 54, 18 Aug., 1950 (25–6).

1679. RANGANATHAN, C. R. **Forest research and education in India.** *Unasylva* 4 (3), 1950 (110–5).

1680. SOEST, J. VAN. Bosbouwkundige onderzoek in Denemarken. [**Forestry research in Denmark.**] *Ned. Boschb.-Tijdschr.* 21 (12), 1949 (357–73). 8 refs. [Du.e.]

1681. SEVNIK, F. Gozdarski institut Slovenije v prvem letu svojega obstoja. [**The Forestry Institute of Slovenia in its first year of existence.**] *Gozd. Vestn.* 7 (6), 1948 (137–44). [Sloven.]

An account of the origin, organization and objects of the new Research Institute at Ljubljana, which the author established in 1947 under the directions of the Ministry of Agriculture and Forestry. The Institute has a mandate to lead, direct and unite all scientific work in forestry and the timber industries in Slovenia. It has 3 main sections (1) policy and economics, including planning and administration, (2) biology, pedology, silviculture and administration, (3) utilization; and has already opened substations and acquired forests for experimental purposes.

1682. Les cahiers de la recherche agronomique. [**Yearbook of agricultural research.**] Service de la recherche agronomique et de l'expérimentation agricole, Rabat. No. 1, 1948. pp. 130 + 22 photos. [F.]

Organization and programmes of agricultural research in French Morocco.

1683. **Science in South Africa.** Council for Scientific and Industrial Research, Pretoria. 1949. pp. 176. P.R.

1684. WICHT, C. L. **Proposals for expansion of agricultural and forest hydrological research in Africa.** *Communication, African Regional Scientific Conference, Johannesburg,* 1949 No. *A (f)* 1, 1950. pp. 4. [E.f.]

Briefly reviews hydrological research so far carried out in the U.S.A., S. Africa, and elsewhere, and makes recommendations for further research in S. Africa. It is considered particularly desirable to test the hydrological effects of agricultural forms of land use in at least 3 regions to begin with—the S.W. Cape, Natal, and E. Transvaal. The establishment in the last of a general agricultural hydrological research station, similar to those in America, should be considered. Forest-influence research is well advanced in the Union, but additional correlative research should be done in the high-rainfall afforestation zone along the escarpment in E. Transvaal.

1685. SILVERSIDES, C. R. **An experimental forest in operation.** *Pulp Paper Mag. Can.* 51 (10), 1950 (160–1). (*Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1099 (*F*–2).)

A brief account of current and proposed research on forest management, silviculture and logging at the Westvaco Experimental Forest of the West Virginia Pulp and Paper Company. Subjects to be investigated include: road construction, control of scrub hardwoods, thinning, seedbed preparation, planting of hybrid Poplars and the production of pulpwood in packaged bundles.

1686. LIEBERMANN, J. Informe preliminar sobre un viaje a la selva de Pay-Ubre, Corrientes. [**Preliminary report on a journey to the forest of Pay-Ubre, Corrientes.**] *Idia* 2 (21), 1949 (20). [Span.] C.G.B.

Notes on discoveries include a brief account of an unidentified parasite on *Prosopis algarrobilla*, which causes tumours on the tree and

often kills it. In parts of the forest about 10% of *P. algarrobilla* are attacked, and it is thought that the disease has reached a stage when it may be considered serious.

09.1. *Forest History*

See also *For. Abstr.* 12 (Nos. 1693, 1708, 1872).

1687. Rosay. La forêt haut-savoyarde: bilan de 90 ans de gestion du Service forestier. **[The forests of Haute Savoie: appraisal of 90 years administration by the Forest Service.]** *Rev. for. franç.* No. 11, 1950 (619–33). [F.]

1688. Plaisance, G. La chasse au hêtre dans le passé. **[The persecution of Beech in the past.]** *Rev. for. franç.* No. 9, 1950 (458–61). [F.]

Cites evidence from the 13–18th centuries, of laws, customs etc. favouring Oak and penalizing Beech in Eastern France.

1689. **Brief summary report on the forest administration in the Central Provinces and Berar, for the years 1941–2 to 1945–6.** *Rep. For. Adm. C.P. & Berar 1946–7*, 1950 (31–64).

1690. Leslie, A. P. **Some historical aspects of forestry in Ontario.** *For. Chron.* 26 (3), 1950 (243–50).

1691. Wind, E. J. Het boswezen in het tijdvaak 1850–1950. **[Forestry [in Indonesia] between 1850 and 1950.]** *Chron. Nat.* 106 (6), 1950 (276–84). [Du.] E.M.B.

09.2. *Pre-history. Pollen Analyses, etc.*

1692. Zeuner, F. E. **Dating the past by radioactive carbon.** *Nature, Lond.* 166 (4227), 1950 (756–7). 8 refs.

The use of radioactive carbon for estimating the age of certain types of archaeological material was conceived by Dr. W. F. Libby of the Institute for Nuclear Studies of the University of Chicago, and he and his fellow-workers have been able to design the necessary apparatus [cf. *For. Abstr.* 11 (p. 278)]. The present article briefly describes the method, and reviews certain discussions of it. It has been pointed out that the method rests on a number of assumptions. Several of these, such as the constancy of cosmic radiation throughout the period involved, are implied in its physical aspects, but there are some geological and archaeological assumptions that deserve close attention; e.g. (1) that carbon-14 is evenly distributed in living matter, (2) that uncontaminated samples are available, (3) that the carbon of the sample was 'recent' carbon at the times when the specimen became an object of archaeological interest. The weaknesses in these assumptions are discussed. It is finally concluded that the use of the method is confined to material originating within the last 20,000 years, which can be extended to a maximum of 30,000 by enriching in a thermal diffusion column.

Libby considered it possible that, because of the latitudinal variation of cosmic radiation, latitudinal differences may exist in the isotopic composition of the carbon in woods grown in different geographical latitudes. An assay of 14 woods showed clearly that there is no such correlation.

In spite of its limitations and difficulties, the carbon-14 method promises to settle many outstanding chronological problems, some of which are briefly discussed.

1693. Bertsch, K. Geschichte des deutschen Waldes. **[The history of German forests.]** Verlag von Gustav Fischer, Jena. 2nd (revised ed.) 1949. pp. 108. [G.] Price 7.80 *DM* [14*s.* 6*d.*]

Essentially an account based on pollen analysis and supported by copious diagrams and maps, of the forest changes in Germany, in relation to the rest of Europe during prehistoric times.

1694. Černjavski, P. Kopaonik i ego lesa. **[Kopaonik and its forests.]** *Godišnjak Poljoprivedno-Šumarskog Fakulteta, Beograd* 1, 1948 (33–43). 6 refs. [Serb.russ.e.] E.M.B.

Gives the results of pollen analyses for several localities in this region, showing 3 phases in post-glacial forest succession, viz. Silver Fir/Spruce, Spruce, and finally Beech. No evidence is found of major climatic variations in this period. The dominance of Beech in the last phase, both here and in other parts of Jugoslavia, is attributed to destructive exploitation, especially of the coniferous forests, by man. The same reason is given for the absence of Spruce in the high mountain belt

of some mountain ranges in Jugoslavia. There was only local glaciation in the Kopaonik region, and the snow line appears to have lain above 1,500 m.; this explains the presence in the deepest peat layers of pollen of all the present tree species, which appear to have been distributed in a mosaic rather than in definite altitudinal belts. The contemporary forest types were formed in the post-quaternary period.

1695. AUBRÉVILLE, A. Contribution à la paléohistoire des forêts de l'Afrique tropicale. **[Contribution to the prehistory of the forests of tropical Africa.]** Sté. d'Éditions géographiques, maritimes et coloniales, Paris. 1949. pp. 100.

The author seeks to explain the present forest flora of the dry tropical zones of Africa and the available prehistoric data in terms of the hypothesis of a shift of the equatorial belt during the Tertiary epoch followed by migrations and destruction of floras. The appendixes include lists of species typical of the various dry tropical areas.

09.4. *Forest Statistics*

See also *For. Abstr.* 12 (Nos. 1660, 2156–7, 2264, 2268, 2272, 2317).

1696. Det enskilda skogsbruket år 1947 av Kungl. Skogsstyrelsen. **[Private forestry [in Sweden] in 1947, by the Royal Forestry Board.]** *Sveriges Officiella Statistik.* Centraltryckeriet Esselte ab., Stockholm. 1949. pp. 110. [Sw.]

1697. Det enskilda skogsbruket år 1948 av Kungl. Skogsstyrelsen. **[Private forestry [in Sweden] in 1948, by the Royal Forestry Board.]** *Sveriges Officiella Statistik.* Centraltryckeriet Esselte ab., Stockholm. 1948. pp. 122. [Sw.]

1698. **Report from the Danish National FAO-Committee of the Food and Agriculture Organization of the United Nations (FAO).** 1950. pp. 93. [E.]

Contains a 12-page chapter on forestry, consisting mainly of statistics.

1699. Oversigt over de Danske Statsskoves Udbytte af Ved og Penge for Finansaaret 1948–49. **[Review of the timber and financial yields of the Danish State Forests for the financial year 1948–49.]** Nielsen & Lydiche (M. Simmelkiær), Copenhagen. 1950. pp. 17 + 1 tbl. [Dan.]

1700. BUCHHOLZ, E. Von der Wald- und Holzwirtschaft Chinas. **[The forest and timber economy in China.]** *Weltholzw.* 2 (9), 1950 (176–8). 6 refs. [G.] P.R.

According to Chinese sources [quoted], the forested area of various parts of China before the war was as follows: Formosa 72·0%, Manchuria 36·0%, Central China 7·5%, Sinkiang 5·0%, Tibet 2·0%, the whole of China about 10%, i.e. *ca.* ¼ of the afforestable area. The estimated yearly timber production of China is 56 million cu.m., i.e. 0·6 cu.m./ha. The timber industry is limited to small plants with primitive equipment. Better developed are the case, barrel and match industries. China has been importing timber (until 1948) in quantities from 0·5 to 2·5 million cu.m. yearly. The new Chinese administration is reorganizing the forest economy of the country, and a Ministry of Forestry has been created. Large-scale afforestation is planned, aiming at soil and water conservation and the protection of crops.

1701. **Indian forest statistics.** Directorate of Economics and Statistics, Dept. of Agriculture, Government of India, New Delhi. 1949. pp. 70.

Gives in summary form and chiefly for the period 1936–7/1947–8 all available data relating to forests and forest products in India. The data refer mainly to the Indian Provinces, though some with respect to a few [Princely] States have been included. Even in the case of the Provinces, the available statistics relate only to Government forests, since very little information is available at present for private forests. Estimates have been made for the partitioned provinces of Assam, East Punjab and West Bengal.

1702. GLENNY, F. H. **Concerning rates of utilization of some of the forest resources and their economic importance in Canada.** *Ohio J. Sci.* 50 (4), 1950 (177–81). C.G.B.

Includes some figures showing area of forest land in Canada and value and amount of forest products between 1939 and 1948.

09.7. *Monographs of Individual Forest Regions*

See also *For. Abstr.* 12 (Nos. 1660, 1672–3, 1700, 1818–21, 1914, 2380).

1703. WITTICH, W. **Impressions of a German forester on a study tour through Great Britain.** *Quart. J. For.* 44 (3), 1950 (121–7 + 2 photos).

Makes some comparisons between forestry in Great Britain and in Germany.

1704. BRIMBLE, J. A. **London's Epping Forest.** Country Life Ltd., London. 1950. pp. 176. Price 30*s*.

Illustrated by over 100 photographs and 12 maps.

1705. RYLE, G. B. **Forestry in South Wales: a generation of destruction and conservation.** *Quart. J. For.* 44 (4), 1950 (193–201 + 4 photos).

1706. ZEHNGRAFF, P. J. **Forestry in Denmark.** *J. For.* 48 (10), 1950 (681–4).

Cf. *For. Abstr.* 12 (Nos. 1673, 1698–9).

1707. **Forests of Denmark.** *Timb. Tr. J.* 194 (3863), 1950 (1485–90).

Report on a tour of the forests of Sjælland made by members of the Royal Forestry Society of England and Wales.

1708. WAUTHOZ, V. L'Ardenne: paysages forestièrs d'autrefois, d'aujourd'hui, de demain. **[The forests of the Ardennes, yesterday, today and tomorrow.]** *Bull. Soc. for. Belg.* 57 (10), 1950 (361–78). [F.]

1709. FRANCEY, J. Le traitement des forêts vaudoises notamment sur le plateau. **[The management of the forests of the Canton de Vaud, particularly on the plateau.]** *Bull. Soc. for. Franche-Comté* 25 (15), 1950 (616–30). [F.]

1710. FRITZ, N. H. **Forestry assignment in Korea.** *Amer. Forests* 56 (8), 1950 (6–11).

A popular article with a few statistics.

1711. HOLMES, C. H. **Some forestry problems in Ceylon and the search for their solution.** *Repr.* from *Proceedings of the 4th Annual Session of the Ceylon Association of Science* 1948. pp. 25. 26 refs.

A review of the most pressing problems and suggested lines of research for their solution.

1712. ERGÜLEC, K. Giresun ormanlari. **[Giresun forests.]** *Orman ve Av* 19 (6; 7), 1947 (109–16; 129–35). [Turk.]

A detailed general description with special emphasis on forest destruction and its remedy.

1713. VAHID, S. A. **Inspection note on the forests of Baluchistan, 1949.** Ministry of Food and Agriculture, Govt. of Pakistan, Karachi. [?1950]. pp. 10 + 5 photos.

1714. LORDAT, J. DE. La forêt marocaine: les peuplements de chênes-lièges. **[The Moroccan forest: the Cork Oak stands.]** *L'Agriculteur provençal, Marseille* 49 (1127), 1950 (1). [F.]

1715. Economía de nuestra Zona de Protectorado marroquí. **[Economy of our Moroccan protectorate.]** *Montes, Madrid* 6 (34), 1950 (521–2). [Span.]

A brief description of the forests of Spanish Morocco, their administration and production.

1716. LUSSIER, O. Les forêts du Québec—contenu, productivité, avenir. **[The forests of Quebec—their standing stock, productivity and future.]** *For. et Conserv.* 2 (4; 5; 6), 1950 (601–6; 671–4; 733–7). [F.]

1717. LAMB, A. F. A. **Pine forests of British Honduras.** *Emp. For. Rev.* 29 (3), 1950 (219–26 + 6 photos).

The forests, in which *Pinus caribaea* predominates, are described and it is shown that, at the present rate of exploitation, all the mature wood will be converted into lumber in 20 years and there will be a drop in available supplies unless immediate steps are taken to introduce more intensive fire protection and form large plantations.

1718. HUGUET, L. La forêt en Guadeloupe: situation et avenir. **[The forests of Guadeloupe: present state and future policy.]** *Rev. for. franç.* No. 11, 1950 (645–58). [F.]

1719. GONGGRIJP, J. W., HULSTER, I. A. DE, and SNIJDERS, J. J. De activering van het Surinaamse bos. **[The development of the forests of Surinam.]** *Houthandel, Schiedam* 3 (10), 1950 (126–30). [Du.] X.

A brief account of the history, composition and exploitation of the forests of Surinam, with tables showing the area of different forest types (from maps and air photographs) and the uses of 58 species.

1. FUNDAMENTAL NATURAL LAWS OF THE FOREST

11.1. *Atmosphere. Meteorology*

See also *For. Abstr.* 12 (Nos. 2497–2502).

11.14. Precipitations. Evaporation. Humidity

See also *For. Abstr.* 12 (Nos. 1737–8, 2287, 2497–2500).

1720. PURI, G. S. **Forest ecology and evaporation measurements in India.** *Repr.* from *Sci. & Cult.* 15 (12), 1950 (465–7). 22 refs.

Reviews work already done in India on the effect of the precipitation/evaporation ratio on soil profiles, and hence on vegetation, in the forest, and urges the need of supplementing the existing arrangements for measuring precipitation in Indian forests, by similar facilities for evaporimeter measurements.

11.15. Light

See also *For. Abstr.* 12 (No. 2502).

1721. AHMAD, S. **Measurement of light in forest stands.** *Indian For.* 75 (1), 1949 (1950) (4–7). 20 refs.

The author first reviews methods previously used (black and white bulb, potentiometer, photo-electric cell) and points out their deficiencies, and then describes a photographic method (not tried out in practice) devised by himself. White screens are set up, one inside the stand and one under the open sky, and cameras are set up 4–6 ft. away from each. The cameras should be electrically coupled to ensure simultaneous exposure, and half-hourly exposures should be made, using a fixed stop and fixed exposure throughout the day. At the end of the day both films should be developed at a fixed temperature for an equal length of time. If these films are then passed through a microphotometer, a curve will be obtained for each film, and the area under each curve will be a measure of the integrated light intensity for the whole day, for the two sets of conditions.

11.17. Solid Particles in the Atmosphere

1722. GILBERT, G. E. **Volumetric and gravity slide tests for air-borne ragweed and Oak pollens at Columbus, Ohio.** *Ohio J. Sci.* 50 (2), 1950 (60–70). 11 refs. [Ohio State University, Columbus.] C.G.B.

The volumetric apparatus described consists of test-tubes (32 × 200 mm.) containing a solution of 60% glycerin, 30% water and 10% ethyl alcohol. Air enters the system through a funnel which is connected to a 3½-in. length of ⅜-in. diameter butyrate tubing. The end of this tubing, which is immersed in the solution, is perforated with 12 1-mm. holes to break up the air stream; glass beads in the collection tube further this process. Counts are made of the pollen trapped in the solution, and are correlated with the volume of air passed through the apparatus. In experiments with ragweed and Oak, conversion factors were evolved for gravity slide tests.

11.4. *Soil*

See also *For. Abstr.* 12 (Nos. 1667, 1720, 1803–5, 1808, 2298).

1723. RUSSELL, SIR E. J. **Soil conditions and plant growth.** Longmans, Green & Co., London. 8th ed. recast and re-written by E. W. Russell. 1950. pp. xvi + 635 + 39 photos. Many refs. as footnotes. Price 35*s.*

A complete re-writing of the standard work first published in 1912.

1724. MITSCHERLICH, E. A. Bodenkunde für Landwirte, Forstwirte und Gärtner in pflanzenphysiologischer Ausrichtung und Auswertung. [**Soil science for agriculturists, foresters and gardeners, with special reference to plant physiology and plant-physiological methods of investigating soils.**] Paul Parey, Lindenstrasse 44–47, Berlin SW 68. 6th ed., 1950. pp. viii + 371. Numerous refs. [G.] Price *DM* 15 [£1. 9*s.* 0*d.*]

1725. AALTONEN, V. T. **Forest soil research in Finland.** *Unasylva* 4 (3), 1950 (116–21).

1726. TAMM, O. **Northern coniferous forest soils: a popular survey of the phenomena which determine the productive character of the forest soils of North Sweden.** Translation from the Swedish by Mark L. Anderson. Scrivener Press,

Oxford. 1950. pp. xii + 253. 121 refs. Price 17*s.* 6*d.*

Translation of a Swedish work published in 1940 [cf. *For. Abstr.* 7 (No. 1049)], with certain additions and emendations by the original author.

11.41. Soil Physics

1727. THOMSON, G. W., and MCCOMB, A. L. **Soil pore space and aeration in several forest communities in Central Iowa.** *J. For.* 48 (9), 1950 (401–7). 26 refs.

A fuller account of studies already reported [cf. *For. Abstr.* 11 (No. 840)].

11.43. Biology of Soil, including Mycorrhiza

See also *For. Abstr.* 12 (Nos. 1731, 2298).

1728. KELLEY, A. P. **Mycotrophy in plants: lectures on the biology of mycorrhizae and related structures.** Chronica Botanica Co., Waltham, Mass. 1950. pp. 223 + 5 plates. 576 refs. Price $4.50 [36*s.*]

1729. LAWRENCE, D. B., and HULBERT, L. **Growth stimulation of adjacent plants by Lupine and Alder on recent glacier deposits in southeastern Alaska.** *Abstr.* in *Bull. ecol. Soc. Amer.* 31 (3), 1950 (58). A.P.B.

Lupinus spp. and *Alnus crispa* subsp. *sinuata* are the first plants to look healthy and grow rapidly on cold raw mineral deposits exposed through glacier recession. Lupin causes associated Willows, grasses and fireweed to bloom and to grow several times as fast as plants growing separately. Young Cottonwood [*Populus* sp.] trees surrounded by Alders grow about 3 times as fast as those living away from Alders. The root nodules on the Alders are thought to bring this about by the symbiotic fixation of atmospheric N, in the same way as lupin and other legumes. A field experiment has been set up in Glacier Bay National Monument to find out exactly how Alder causes this stimulation.

11.44. Litter. Surface Humus

1730. DUCHAUFOUR, P. L'humus forestier et les facteurs de sa décomposition. **[Forest humus and the factors in its decomposition.]** *Rev. for. franç.* No. 9, 1950 (479–88). [F.]

The author elaborates his thesis that the C/N ratio is a more generally useful criterion of the nature of the litter and humus layer in a forest than its pH. [Cf. *For. Abstr.* 11 (No. 2561).]

1731. READ, R. A., and WALKER, L. C. **Influence of Eastern Red Cedar on soil in Connecticut Pine plantations.** *J. For.* 48 (8), 1950 (337–9). 9 refs.

Physical and chemical properties of surface soil beneath *Juniperus virginiana* in Pine plantations in Connecticut were found to be different from those beneath adjacent Pines. Properties of the surface soil below Red Cedars were apparently influenced by the high Ca content of the litter (2% compared with less than 1% for White and Red Pines), its decomposition products, and subsequent incorporation in the soil by earthworms. In the older Pine plantation studied, earthworm activity was confined to the area directly beneath the few Red Cedars in the stand. [Cf. *For. Abstr.* 11 (No. 2551); 12 (No. 56).]

11.45. Soil Surveys

See also *For. Abstr.* 12 (No. 2528).

1732. WITTICH, W. **Soil mapping in Germany.** *Quart. J. For.* 44 (4), 1950 (207–12).

Describes the methods employed in soil mapping and the means by which the results of such mapping can be given so that they can easily be used by practical foresters.

11.47. Maintenance of Favourable Soil Conditions. Soil Fertility

See also *For. Abstr.* 12 (Nos. 1940, 1946, 2298).

1733. NELSON, T. C. **Higher animals and forest soil fertility:** *J. For.* 48 (10), 1950 (722).

Samples of deer (*Odocoileus virginianus borealis*) droppings in a Cedar/Spruce swamp in Michigan indicated a composition of 1·38% N, 0·80% P_2O_5, and 0·26% K_2O, which compares favourably with that of farmyard manure. The average daily weight of droppings from each of 4 hinds and one male fawn fed on Cedar browse during a 10-day period, was 1083·6 g. (2·38 lb.). During an average winter yarding period of 90 days, about 400 lb.

of manure/acre/year would be applied through natural means in a deer yard supporting a concentration of 2 deer/acre.

1734. BOOMSMA, C. D. **Phosphate for top dressing as a normal plantation operation.** *Aust. For.* 13 (2), 1949 (1950) (108–12 + 4 photos). 3 refs.

The standard agricultural practice of fertilizing the soil with superphosphate has been extended to a number of young *Pinus radiata* plantations in S. Australia. Data on costs, methods of application and growth response, derived from 450 acres in Second Valley Forest Reserve, are presented and discussed. The plantations selected for treatment all showed symptoms of nutrient deficiency. Significant increases in height growth, and a change from a sparse, chlorotic crown to a normal dense habit, followed applications of superphosphate at a rate of 8 cwt./acre to plantations from 1 to 14 years old and in natural regeneration up to 15 years old. Application was by hand and the best apparatus was found to be a canvas bag holding 50–60 lb., carried on the back, with a tapered pipe having an outlet of 1·5 in. diameter. For trees 1–3 years old, fertilizer is concentrated round the trees in a circle of *ca.* 12–18 in. from its base. Larger trees receive a dressing broadcast evenly throughout the plantation. Costs are calculated on a basic wage of £5. 10*s.* 6*d.* per week of 40 hours and fertilizer at 8*s.* 6*d.*/cwt. The labour cost/cwt./acre varied from 9*d.* for an 8-cwt. treatment to 7*s.* 3*d.* for a 2-cwt. treatment. Labour costs also varied with the height and density of the undergrowth. At 3% interest, the total compounded cost at rotation age (40 years) of rehabilitating defective stands with a single treatment of 8 cwt./acre at a cost of £4/acre applied at 10 years, is £9. 14*s.* and a 2nd treatment at 15 years amounts to £8. 8*s.*—a total of £18. 2*s.* for two treatments. Even a 3rd treatment, if necessary, might prove economic.

11.48-9. Soil Types

See also *For. Abstr.* 12 (Nos. 1803–5, 1808).

1735. DUCHAUFOUR, P. Recherches sur l'évolution des sols calcaires en Lorraine. **[Studies in the evolution of calcareous soils in Lorraine.]** *Ann. Éc. Eaux For. Nancy* 12 (1), 1950 (97–153). 59 refs. [F.f.]

It is shown that to the 3 main vegetation types found on calcareous soils in Lorraine (xerophilous grassland, fruticetum and *Fagetum*) correspond respectively rendzina, transitional soils (black rendzinas, rendzina-like brown soils) and brown forest soils. The soil climax is a deep, brown soil, slightly leached, slightly acid, in equilibrium with the old *Fagetum* on a mull soil which represents the vegetation climax. It is considered that this climax is the result of a progressive evolution through the 3 stages mentioned above, which are analysed in detail, and that soil degradation as a result of deforestation, over-grazing etc., reverses the process. It is noteworthy that the soil climax is the same whether the parent rock is calcareous as in this instance, or clayey or siliceous [cf. *For. Abstr.* 12 (No. 72)]. The climax profile of forest soils is therefore relatively independent of the parent rock, the decisive factors being the forest microclimate and the properties of the forest humus. On the other hand, when the forest is destroyed, the type of soil which results from the degradation of the forest soil is essentially variable and is closely related to the type of parent rock.

1736. MCCALEB, S. B., and CLINE, M. G. **Profile studies of normal soils of New York: III. Physical and chemical properties of brown forest and gray-brown podzolic soils.** *Soil Sci.* 70 (4), 1950 (315–28). 20 refs.

Present results of investigations into particle-size distribution, bulk density, organic matter, cation-exchange capacity, pH, and total composition of genetic horizons of each of 10 profiles, ranging from neutral intergrades between brown forest and gray-brown podzolic soils to strongly acid gray-brown podzolic soils.

11.6. *Hydrographical Conditions. Water and Soil Conservation*

See also *For. Abstr.* 12 (Nos. 1684, 1720, 1749, 1836, 1882, 1908, 1955–9, 2517, 2547).

1737. D[UTHIE], D. W. **Vegetation and water resources.** *E. Afr. agric. J.* 16 (1), 1950 (1–2).

Account of some of the papers read at a meeting held at Nairobi in 1949 to correlate work already under way on those aspects of hydrology which have a bearing on the utilization of water by vegetation. Representatives

of the Hydrological Section Public Works Dept., the Agricultural and Forest Depts., the Soil Conservation Service, the East African Meteorological Department, and the East African Agricultural and Forestry Research Organization, discussed the organization of future research. Amongst the experiments discussed were that in the Kikuyu Escarpments forest to compare interception by Cypress and Bamboo [cf. *For. Abstr.* 9 (No. 2060)], and a more recent one on the rate of penetration of rainwater into the subsoil under Cypress [*C. macrocarpa*] and Bamboo [*Arundinaria alpina*]. The first few readings indicated that the subsoil under Bamboo is drier than that under Cypress, but it is too early to draw conclusions. Another subject of discussion was the study of moisture changes in soils under Coffee.

1738. SANDERSON, M. **Three years of evapotranspiration at Toronto.** *Canad. J. Res.* 28*C* (5), 1950 (482–92). 7 refs. P.R.

An experiment to measure the daily potential evapotranspiration from vegetation-covered soil surfaces was conducted in Toronto during the 1947, 1948 and 1949 growing seasons. The potential evaporation from moist bare soil was also measured and compared with the evaporation from dry soil. Results indicate that the Thornthwaite formula for computing potential water loss is valid at the latitude of Toronto for both vegetation-covered and moist soil. When drying of the surface soil occurred, the water loss was diminished. *Author's abstract.*

1739. MARTINEZ-FALERO y ARREGUI, J. Trabajos hidrológico-forestales realizados en la capital de Málaga para su defensa contra las inundaciones y daños producidos por los torrentes y ramblas. [**Stream-flow regulation and reforestation work accomplished in the capital of Malaga for its protection against floods and damage caused by torrents and sedimentation.**] *Montes, Madrid* 6 (33), 1950 (292–335). [Span.]

An illustrated account of work achieved up to 1946.

1740. STERNBERG, H. O'R. **Floods and landslides in the Paraiba valley, December 1948: influence of destructive exploitation of the land.** *Conservation in the Americas, Pan American Union, Washington, D.C.* No. 8, 1950 (2–20). 43 refs.

1741. **How forest conditions affected the 1948 Columbia flood.** *U.S. Dep. Agric. AIB* No. 10, 1950. pp. 17.

Analysis of the available data indicates that the primary cause of the flood was excess precipitation over the catchment area, but that denuded and eroded forest slopes contributed more than their share of flood water and debris. In particular, snow melt was much slower on the forested areas.

1742. GANSSEN, R. Mitteilungen über die Winderosion auf Böden Niedersachsens. [**Reports on wind erosion on soils of Lower Saxony.**] *Mitt. Bundesanst. Forst- u. Holzw.* No. 14, 1950. pp. 14 + [6]. 17 refs. [G.g.]

Lists, with a sketchmap, the localities where serious wind erosion occurred in the dry spring of 1947, with special reference to the soil types affected (chiefly light, acid podzolized soils and sands). The damage is attributed to a combination of causes, including deforestation, cropping of too light, acid, humus-deficient soils formerly under forest or heath, exceptional weather, and faults in soil husbandry. The exceptional weather only transformed latent into acute trouble and the primary cause is seen in the clearing of forests and hedges, since where these were intact there was no serious wind erosion in spite of unfavourable weather and poor soil. Recommended countermeasures are the preservation or re-establishment of woods and hedges in endangered areas, and the improvement of old agricultural land rather than the creation of new agricultural land on poor soils that should remain forested.

1743. MORT, G. W. **Vegetation of the marine sand drifts of N.S.W. Some remarks on useful stabilizing species [Marram grass and sand spinifex (*Spinifex hirsutus*)].** *J. Soil Conserv. Serv. N.S.W.* 6 (2), 1950 (63–72). 7 refs.

1744. RANGHEL GALINDO, A. Las barreras vivas en la conservación del suelo. [**[Plants for] contour strip cultivation for soil conservation.**] *Agric. trop., Bogotá* 5 (7), 1949 (33–40). 6 refs. [Span.] A.P.B.

Includes some tree and shrub species for strip planting in coffee and cocoa plantations and in orchards.

12. FOREST BOTANY. TREE SPECIES

12.1. *General Botany*

12.11. Physiology. Reproduction. Growth

See also *For. Abstr.* 12
(Nos. 1667, 1723–4, 1728).

12.11.1. *Plant Constituents. Metabolism. Photosynthesis. Translocation. Sap Flow. Transpiration. Growth Substances. Enzymes*

See also *For. Abstr.* 12
(Nos. 1737–8, 1773, 1780, 1992, 2227, 2230–2, 2236–42, 2249–51, 2256–8, 2297).

1745. SOSA-BOURDOUIL, C. Études physiologiques sur *Ginkgo biloba* L. [**Physiological studies of *G. biloba* [its water absorption and chemical composition].**] *Ann. Sci. nat.* (*Bot.*) (*Sér.* 11), 10, 1949 (145–62). 38 refs. [F.] O.B.D.

1746. GOVINDARAJAN, V. S., and SREENIVASAYA, M. **A papyrographic study of the nonprotein nitrogen of Mangoes (*Mangifera indica* Linn.).** *Curr. Sci.* 19 (8), 1950 (234–6). 6 refs. [Indian Institute of Science, Bangalore.] A.P.B.

1747. STADELMANN, R., and MIRIMANOFF, A. Contribution à la phytochimie du péricarpe de *Juglans regia* L. [**The chemistry of the pericarp of *J. regia*.**] *Phyton, Annales Rei Botanicae, Horn* 2 (1/3), 1950 (1–7). 11 refs. [F.] [Laboratoire de Pharmacognosie de l'Université, Genève.] O.B.D.

1748. IVANOV, L. A., SILINA, A. A., and TSEL'NIKER, YU. L. O metode bŷstrogo vzveshivaniya dlya opredeleniya transpiratsii v estestvennŷkh usloviyakh. [**Rapid weighing method for determining transpiration under natural conditions.**] *Bot. Zh. S.S.S.R.* 35 (2), 1950 (171–85). 25 refs. [Russ.] [Institut Fiziologii Rasteni im. K. A. Timiryazeva, Moscow.] P.R.

Describes experiments made in 1948–9 in the Serebryannŷ Bor forest of the Forest Institute of the U.S.S.R. Academy of Sciences, near Moscow, to investigate the sudden rise in transpiration that occurs when twigs are cut, and to eliminate, so far as possible, the resulting errors in transpiration values. In all experiments, transpiration was expressed in mg. per g. of fresh leaf weight per hour, fresh leaf weight being calculated from a weighing of leaves stripped from the twigs immediately after the weighings made to determine transpiration. For field work, an ordinary balance sensitive to 5 mg. was used; this was housed in a portable box placed on a portable table or slung by a cord on the stem of the tree. Before cutting, twigs were provided with a loop of thread to hang on the hook of the balance. In one series twigs were bent into and cut in melted paraffin (m.p. 58° C.), and in another, twigs were cut in air, weighings being made simultaneously by two workers at 1-min. intervals from 1 to 5 min. after cutting. The largest series were those for Pine (49 tests), Birch (51) and Oak (22), in July and September, at temperatures of 12–30° C. Results showed that, compared with twigs cut in paraffin, those cut in air had higher transpiration values in the first 4–5 min., the difference being as much as 37–52% for the first minute after cutting. In further studies in the laboratory, whole plants, 3–5 years old, were lifted with roots intact in a ball of earth which was wrapped in waterproof material to prevent evaporation, the plants with their earth balls weighing up to 190 g. each. When the balance had been brought to equilibrium, 20–50 mg. were removed and the interval taken to re-establish equilibrium through transpiration losses was checked with a stop-watch. By continuing this process, the rates of transpiration before cutting were determined and used as control values. Species thus tested (8–10 tests per species) included Caragana, Birch, Oak, Ash, Rowan and Lime. For the series cut in air, it was possible to cut twigs at moments of equilibrium and thus to obtain a continuous record of transpiration; in the other series the first minute after cutting was missed, since, owing to the weight added by the paraffin, equilibrium had to be restored before readings could continue. As compared with the control values, the series cut in air showed an enormous rise in transpiration in all species tested, occurring in the first minute after cutting, and thereafter the values varied in an irregular manner in the different species. The series cut in paraffin showed a very much smaller rise in

the second minute after cutting, declining fairly regularly in the different species during the succeeding 2 minutes. An attempt was made, using a torsion balance, to determine the exact incidence of the rise for Birch (40 tests) and Norway Maple twigs (10) cut in paraffin, but even weighings 15 seconds after cutting showed only the post-peak values of the rise and it seems probable that the peak occurs almost immediately after cutting. It is suggested that when the cut releases the elastic vessel walls from the stress in which they are held by suction, the stress change in the vessel-wall/water system travels by wave motion to the mesophyll. In such a mechanism, plants may have a very sensitive, rapid, and self-regulating system for the adjustment of transpiration to water supply in the vessels. Cutting in paraffin would restrict, but not eliminate, such adjustments, since the paraffin could not set and fix the vessels instantaneously. In view of this, the laboratory figures, together with field values obtained for Birch and Rowan, were re-examined and it was found that the *mean* transpiration rate for the 3-minute period 1–4 min. after cutting, when the twigs are cut in paraffin, is a close approximation to the control value, the difference varying from + 4·1 to − 4·4% in the different species. It is stressed that for such comparatively reliable results the values must be the averages of at least 5–10 repetitions, and that further work is needed to determine whether this conclusion would also hold good in the dry regions of S. Russia.

The paper concludes with the standard procedure devised for field work: (1) Selection of tree and place for balance; notes on site and tree concerned. (2) Setting up the apparatus and instruments (thermometer, hygrometer and anemometer) in the shade. The balance must also be in shade and protected from strong wind. (3) Selection and preparation of twigs to be weighed (the loop of thread should allow the cut twig to hang as nearly as possible in its natural position). (4) Cutting in paraffin, with a diagram illustrating a suitable pot with spirit lamp for melting the paraffin. The cut is made with a sharp knife and the time of cutting is noted to the nearest second. (5) First weighing, 1 min. after cutting, with simultaneous readings of other instruments and recording of sunshine and cloud cover. (6) Second weighing, timed to give correct reading exactly 3 min. after the first, together with repeat readings of the other instruments. (7) Stripping and weighing of the leaves immediately after (6). This weight plus the value obtained for 3 minutes' transpiration, gives the fresh weight at time of cutting, and the transpiration per g./hr. can be calculated.

1749. HENRICI, M. **The transpiration of South African plant associations. Part III. Indigenous and exotic trees in the Drakensberg area.** *Sci. Bull. Dep. Agric. S. Afr.* No. 247, [?1947]. pp. 43 + 43 gphs. 14 refs.

For earlier reports see *For. Abstr.* 9 (Nos. 750–1). The object of the present study was to determine whether, under the moderately high rainfall of the Drakensberg area, the planting of exotic Pines, Wattles and Eucalypts has the effect of drying up wells. The method was to measure transpiration by the use of the torsion balance, values being calculated on fresh matter and surface occupied. Measurements were made on indigenous as well as exotic species. The data are given in a series of tables and also graphically, for a large number of species. The smallest water losses were shown by indigenous sclerophyllous trees. Of the exotics, the conifers investigated (*Pinus*, *Cupressus*, *Callitris* and *Podocarpus* spp.) always have a small transpiration and it is considered impossible that they could, by transpiration, endanger water supplies. Wattles and some species of Eucalypts, on the other hand, squander water if available, and become a source of danger if the water supply is limited, and it is recommended that they should not be used for planting in water catchment areas in S. Africa. Wind does not, in general, increase transpiration. The only species which showed increased transpiration in windy weather was *Jacaranda ovalifolia*. [Cf. *For. Abstr.* 11 (No. 851).]

1750. MILLETT, M. R. O. **Some transpiration experiments with Eucalypts and Pines.** *Summary* in *Weather, London* 2, 1947 (358). E.M.B.

The paper describes some transpiration experiments with Eucalypts and Pines, carried out at the Forestry and Timber Bureau, Canberra. The early experiments were with small seedlings, in containers of 11 litres capacity, with such species as *Eucalyptus blakelyi*, *E. melliodora* and *Pinus radiata*. Since it was desired to obtain information on the rate of transpiration of trees

of larger size, seedlings of *Eucalyptus goniocalyx* and *Pinus radiata* were raised in drums of 110 litres capacity, the Eucalypts reaching a height of 5 ft. Measurement of transpiration was by weighing. Leaf area and stomatal frequency were measured and coefficients of transpiration were calculated. Other experiments were carried out with cut shoots in flasks of water, using *Eucalyptus dalrympleana* and *Pinus radiata*. Branches remaining on trees of *Pinus radiata* and *Eucalyptus gigantea* were inserted into glass flasks which were sealed but had a cock for releasing for measurement from time to time the condensed water vapour transpired by the branches. These gave interesting diurnal and seasonal variations.

Transpiration rates given by the three different methods are compared. The results suggest that more valuable information about transpiration might be given for larger trees by using the lysimeter method employed at the San Dimas Experimental Forest [cf. *For. Abstr.* 10 (No. 891)].

1751. OPPENHEIMER, R. **[Water balance in *Quercus ithaburensis*.]** *Forest, Palestine* No. 2, 1950 (30–2, Suppl. 7). [Heb.e.]

Field experiments in June 1946 showed that this species loses great amounts of water by leaf transpiration. Leaves taken from the sunny side of trees and weighed immediately in Huber's scales lost moisture per g. of fresh substance, as follows (1) afternoon, 925 mg./hr.; max. rate 1,095 mg./hr., before sunset 490 mg./hr. (2) morning, 800–1,000 mg./hr. in sun; 500–700 mg./hr. when sun clouded over. Leaves from the shady side of the tree gave 556 (sun) and 258 mg./hr. (clouded). Loss rates for individual leaves declined as follows: 2nd to 3rd minute after picking, 824·5; next 2 minutes, 330; 10 mins. after first weighing, 152 mg./g./hr.

The author considers that *Q. ithaburensis* balances its water needs adequately up to the end of the dry season, and suggests that its intrinsically high water demand may explain its very wide spacing in natural forest. [Cf. *For. Abstr.* 9 (No. 2095).]

1752. KUPREVICH, V. F. Vnekletochnŷe fermentŷ provodyashchikh tkaney drevesnykh porod. **['Extracellular' enzymes of the conductive tissues of tree species.]** *Bot. Zh. S.S.S.R.* 34 (6), 1949 (613–7). 4 refs. [Russ.] P.R.

Tabulates and discusses the results of a study in which samples of cambium, phloem or wood (up to 2 years old)—so far as possible uninjured—were tested for enzyme activity on various media. The species used were *Larix decidua*, *Pinus sylvestris*, *Thuja occidentalis*, *Populus tremuloides*, *Salix caprea*, *Quercus robur*, *Ulmus glabra*, *Acer platanoides* and *Tilia cordata*. Cambium and phloem in June and July secreted catalase, tyrosinase, phenolase, asparaginase (*Acer* only), urease, amylase, invertase, and protease. Other tests revealed cellulase (traces in *Malus sylvestris*) and lipase (*Tilia*) in the same tissues. Wood, tested in early September, showed considerable amylase, invertase and urease activity, but little for catalase, tyrosinase and phenolase; asparaginase and protease were not detected. Wood of the conifers showed less activity than that of the hardwoods.

Taking all samples together, amylase, invertase, urease and catalase were the most active, being found in almost all samples. In cambium and wood, β-amylase predominated, and in phloem, α-amylase.

It is suggested that there is an analogy between the physiological rôles of such 'extracellular' enzymes in phloem and wood on the one hand, and those of the saprophytic fungi and bacteria on the other.

12.11.2. *Reproduction. Propagation. Growth Development*

See also *For. Abstr.* 12 (Nos. 1789, 1900, 1940, 1942–9).

1753. CHADWICK, L. C. **The effect of certain mediums and watering methods on the rooting of cuttings of some deciduous and evergreen plants.** *Proceedings, American Society for Horticultural Science, East Lansing* 53, 1949 (555–66). 3 refs. [Ohio State University, Columbus, Ohio.] E.M.B.

Cuttings of *Hamamelis vernalis*, *Kolkwitzia amabilis*, *Lonicera korolkovii*, *Malus baccata mandshurica*, *Myrica caroliniensis*, *Viburnum* spp., *Weigela* sp., Lilacs, *Euonymus* spp., *Pyracantha coccinea pauciflora*, varieties of *Rhododendron catawbiense*, and *Ilex opaca* were rooted in different media (vermiculite Nos. 1 and 2, No. 7 silica sand, sphagnum peat and mixtures of these) and using different watering methods. Results (tabulated) show

that the overhead watering method and, in most cases, a medium consisting of a mixture of vermiculite No. 1 with silica sand, were the most effective. *Taxus media brownii*, *T. cuspidata*, *Juniperus chinensis pfitzeriana*, *J. virginiana kosteri*, and *Thuja occidentalis elegantissima*, were rooted in bank sand, vermiculite Nos. 1 and 2, and Nos. 5 and 7 silica sand. Vermiculite No. 1 gave the best, and vermiculite No. 2 and No. 7 silica sand satisfactory results. Overhead watering was preferable. Cf. *For. Abstr.* 11 (No. 2517).]

1754. CHADWICK, L. C. **Some results with the use of opaque structures for propagation by cuttings.** *Proceedings, American Society for Horticultural Science, East Lansing* 53, 1949 (567–72). 3 refs. [Ohio State University, Columbus, Ohio.] E.M.B.

Experiments were conducted in a basement lit by fluorescent lights. Species included *Ginkgo bibloba*, *Hamamelis vernalis*, *Styrax japonica*, *Viburnum* spp., *Euonymus* spp., *Juniperus chinensis pfitzeriana*, *Taxus cuspidata*, *T. media brownii*, and *Thuja occidentalis elegantissima*. Rooting response was in no case better, and often worse, than that obtained in greenhouse conditions.

1755. DABRAL, S. N. **A short note on the propagation of *Cryptomeria japonica* and *Casuarina equisetifolia* by branch cutting.** *Indian For.* 74 (11), 1948 [1950] (393–4 + 2 photos).

Branch cuttings from 8-year-old *Cryptomeria japonica*, 5 in. long and with the base leaves trimmed off, were treated (1) with Seradix No. 2, (2) with Seradix No. 3, and (3) untreated as controls, and planted (*a*) in sand, (*b*) in standard nursery soil. After 3 months the rooting % in (1), (2) and (3) was respectively 80, 80, and 100 for (*a*) and 0, 0, and 4 for (*b*). Similar tests with *Casuarina equisetifolia* gave negative results except for cuttings treated with Seradix 3 and planted in sand, which gave 40% rooting.

1756. PAM, A. **The vegetative reproduction of *Metasequoia glyptostroboides*.** *J. R. hort. Soc.* 75 (9), 1950 (359). O.B.D.

Cuttings taken in December from an individual that had developed a double leader, were placed in sandy soil in a propagating frame in a warm house. The plant was completely dormant and leafless at the time when the cuttings were taken. By the middle of April every cutting had rooted. Good growth was made after potting, and at the time of writing the plants were 15 in. high.

1757. ANIĆ, M. O uzgoju sadnica kanadske topole iz reznica. **[Propagating hybrid Black Poplars from cuttings.]** *Glasn. šumske Pokuse* 9, 1948 (121–56). 23 refs. [Croat.e.]

Presents results of experiments made at the forest nursery of the Faculty of Agriculture and Forestry, Zagreb University, in 1940–47. One-year-old cut-back nursery-grown plants raised from cuttings proved successful for afforesting low-lying areas. Cuttings should be taken from the middle and upper portions of well developed, healthy, well lignified, one-year-old shoots from specially maintained stool beds. Best results were obtained from cuttings taken immediately before planting in the nursery. The top of the cutting should be cut somewhat obliquely immediately above a lateral bud; the bottom, cut at right angles to the axis. The best length for local conditions was *ca.* 20–25 cm. (having 6–7 buds), and the most suitable diameter 8–10 mm. For best results the cuttings should be set vertically with the topmost bud level with the soil surface; this favours rapid occlusion of the cut end and the development of a single shoot, and gives a higher proportion of usable planting stock.

1758. BRETZ, T. W., and SWINGLE, R. U. **Propagation of disease-resistant Elms.** *Amer. Nurserym.* 92 (4), 1950 (7–9, 65–6). 16 refs.

Cf. *For. Abstr.* 11 (Nos. 2524–5). Chiefly concerned with propagation by leaf-bud cuttings.

1759. ARMSTRONG, W. D., and BRISON, F. R. **Delayed incompatability of a Live Oak/Post Oak graft union.** *Proceedings, American Society for Horticultural Science, East Lansing* 53, 1949 (543–5). 3 refs. E.M.B.

A graft of *Q. virginiana* on *Q. stellata* appeared to grow normally for 16 years and then failed. Examination showed that after 6–7 years breaks began to occur in the union between stock and scion.

12.11.3. *Heredity. Breeding. Hybridization. Races and Questions of Provenance. Cytology*

See also *For. Abstr.* 12 (Nos. 1676, 1772, 1804, 1835, 1840, 1886–8, 1938, 2492).

1760. PAVARI, A. Genetica forestale. **[Forest tree breeding.]** *Repr.* from *Atti del Congresso Agrario Nazionale, Turin 1948*, 1948. pp. 24. 19 refs. [It.]

1761. RAMANATHAN, K. **Addendum to list of chromosome numbers in economic plants.** *Curr. Sci.* 19 (5), 1950 (155). [Agricultural Research Institute, Coimbatore.] A.P.B.

[Cf. *For. Abstr.* 12 (No. 115).]

1762. WETTSTEIN, W. VON. Alpenlärchenrassen. **[Forms of Alpine Larch.]** *Züchter* 17/18 (2), 1946 (40–4). 9 refs. [G.] C.G.B.

Further experiments with the progeny of Larch [*Larix decidua*] seed from the Gschnitz valley [cf. *For. Abstr.* 4 (91)] substantiate the previously noted difference in number of needles and dry-matter content in trees above and below an altitude of 1,500 m., and confirm the existence of two distinct forms of *L. decidua* in the Tyrolean Alps.

1763. MOLINA RODRIGUEZ, F. Sobre la mejora genética de *Pinus pinaster* Sol. **[Breeding improved forms of *P. pinaster* Sol.]** *Montes, Madrid* 6 (34), 1950 (499–510). 20 refs. [Span.]

A discussion of methods suitable for Spain's particular problems.

1764. SCHRÖCK, O. Die Vererbung der Frühblüte der Kiefer. **[The inheritance of precocious flowering in Pine.]** *Repr.* from *Züchter* 19 (8/9), 1949 (247–54). 17 refs. [G.g.] [Zentralforschungsanstalt für Pflanzenzucht, Müncheberg/Mark, Abt. Forstplanzenzüchtung Waldsieversdorf/Mark, Höhenld.]

Investigation of trees showing early sexual maturity showed that this is an inherited characteristic and not a product of outward circumstances. No difference in height and diameter growth between precociously flowering and normal trees was observed. It is considered that precocious flowering is a product of cross-pollination from foreign strains and that it is a dominant character. The frequency of dioecious forms among this type of tree is noteworthy.

1765. WETTSTEIN, W. VON. Selektion von Kiefern nach 4 Jahren. **[Selection of Pine within 4 years.]** *Züchter* 19 (7), 1949 (205–6). [G.] C.G.B.

Presents a diagram showing the comparative (average) height growth of 1-, 2-, 3- and 5-year-old *Pinus sylvestris* seedlings and transplants grown from seed taken from selected (open-pollinated) individuals in 4 successive seed years, the comparison being made against the average height of contemporaries (grown in long rows alternating with those of the individual tree progenies) derived from mixed seed of the same stand and designated as 'standard'. This arrangement, and the fact that the population obtained represents successive seed crops from the same parent treees, is considered to make up for the absence of replication by plots. Mother trees whose progeny uniformly shows little divergence in height growth from that of the 'standard', are regarded as good mother trees, and those that are consistently above standard, as élites. The author believes that by this means standard and elite strains can be distinguished within a space of 4–5 years.

1766. PRYOR, L. D. **A hybrid *Eucalyptus*.** *Proc. Linn. Soc. N.S.W.* 75 (347/348), 1950 (96–8 + 2 photos). 5 refs. P.R.

From field occurrence, morphological affinity and open-pollinated progeny tests, evidence is adduced which strongly indicates the natural occurrence of a hybrid between *Eucalyptus pauciflora* and *E. dives* in the Australian Capital Territory and Southern Tablelands of New South Wales. The hybrids were previously referred to *Eucalyptus vitrea*. *From author's summary.*

1767. PAULEY, S. S. **Ecotypic variation in *Populus* species.** *Abstr.* in *Genetics, Menasha* 35 (1), 1950 (129). C.G.B.

Clone collections representing various geographic origins of some important *Populus* species were undertaken by the Cabot Foundation for Botanical Research in 1947. Marked variations are apparent between such clones, which must be attributed to genetic differences. Many variations concern the time of certain physiological functions, especially leaf emergence in spring, and growth termination and leaf fall in autumn. *P. trichocarpa* clones from

Alaska finish growth in the latter part of August at the latitude of Boston, whereas those of southern-Oregon origin remain in active growth until the middle of October. All clones of far-northern origin are uniformly dwarfed when grown in the shorter day of the Boston latitude. Other apparent ecotypic variables include resistance to *Melampsora* rust, growth rate, branching habit, stem form, leaf and bark colors, and leaf shape. [Cf. *For. Abstr.* 12 (Nos. 1885–8).]

1768. WETTSTEIN, W. VON. Die 'Zellulosepappel'—ihr Kultur und Züchtung. **[Poplar—its cultivation and selection for pulp production.]** *Züchter* 17/18 (1), 1946 (13–9). 29 refs. [G.] C.G.B.

Reviews work done in this field, and describes some experiments made at Münchberg to assess the influence of genetic factors and spacing on yield, stem form and cellulose content of 3 different *Populus* spp., with the object of selecting suitable strains for rapid cellulose production from young trees. The closer spacing (1 × 0·5 m.) of the two tested, produced the greater increment within 4 years. The selection of suitable strains, however, seems more important for raising trees with a high cellulose content. [Cf. *For. Abstr.* 11 (No. 959).]

1769. BOGDANOV, P. L. Vegetativnaya gibridizatsiya topoley. **[Vegetative hybridization of Poplars.]** *Bot. Zh. S.S.S.R.* 35 (1), 1950 (19–28). 5 refs. [Russ.] [Tsentral'nȳ Nauchno-issledovatel'ski Institut Lesnogo Khozyaystva, Leningrad.] P.R.

Gives a more detailed account of the graft hybrids reported in a previous paper [see *For. Abstr.* 9 (No. 1464)], with photographs of long-shoot leaves and tabular summaries of characters of the graft hybrids and of the species used as stock and scions. For the two different plants representing *P. suaveolens* + *P. nigra*, data are given on the size and number of cells, shape of cell-wall and stomatal frequency, in leaf epidermis. It is noted that although in general the graft hybrids, like sexual hybrids, showed intermediate characters, yet mosaic structures also occurred and in some cases new characters emerged which neither stock nor scion parents had possessed (e.g. pubescence of young leaves, high stomatal frequency, very early flushing). Differences in resistance to rust, aphid attack and frost, were also observed. Of the four successful graft hybrids, two were lost in the siege of Leningrad and one has been severely injured by frost. The remaining tree—*P. suaveolens* + *P.* '*Eucalyptus*' [× *P. canadensis* var. *regenerata* or *serotina*?]—is still growing well. In 1943 it produced one shoot in the crown that has developed into a branch which, while 'hybrid' in character, is closer to *P. suaveolens*. At 12 years of age this tree was 10 m. tall and 12 cm. in diameter. In 1946 it produced ♀ flowers, but no seed.

12.12. Teratology

1770. ANTO. Šiške—cecidia—Makedonije. **[Galls from Macedonia.]** *Glasn. šumske Pokuse* 9, 1948 (43–94). 12 refs. [Croat.f.]

Presents data on about 120 galls caused by parasites (mostly insects, mites and fungi) and collected from 50 spp. in Macedonia during 1938–40. Most of the galls were found on Oak, Willow and Poplar. Publication of this work was delayed by the war.

12.13. Embryology

1771. SCHANDERL, H. Die Entwicklungsgeschichte des Embryos bei den Rosaceengattungen *Prunus, Pyrus* and *Malus*. **[The development of the embryo in *Prunus, Pyrus* and *Malus*.]** *Züchter* 19 (7), 1949 (206–10). 4 refs. [G.] C.G.B.

12.14. Organography. Morphology. Anatomy. Histology

See also *For. Abstr.* 12 (Nos. 1789, 1844, 2230).

1772. HENNING, W. Morphologisch-systematische und genetische Untersuchungen an Arten und Artbastarden der Gattung *Malus*. **[A study of the morphology, systematics and genetics of species and interspecific hybrids of the genus *Malus*.]** *Züchter* 17/18 (10/12), 1947 (289–349). 66 refs. C.G.B. [G.g.]

1773. MÜLLER-STOLL, W. R., and MICHAEL, K. Untersuchungen über die Eigenschaften der Beeren und Blätter von süssen und bitteren Ebereschen (*Sorbus aucuparia* L.). **[The [morphological and chemical] characteristics of berries and leaves of sweet and bitter forms of *S. aucuparia*.]** *Züchter* 19

(8/9), 1949 (233–47). 22 refs. [G.g.] [Forstbotanisches Institut und Versuchsabteilung für Forstpflanzenzüchtung Tharandt bei Dresden.] C.G.B.

1774. MONEY, L. L., BAILEY, I. W., and SWAMY, B. G. L. **The morphology and relationships of the Monimiaceae.** *J. Arnold Arbor.* 31 (4), 1950 (372–404 + 4 plates). 21 refs.

1775. MEHRA, P. N. **Inequality in size of the male nuclei in the genus *Ephedra*.** *Ann. Bot.* 14 (55), 1950 (331–9 + 2 plates), 6 refs. [University of the East Punjab. Amritsar.] O.R.E.

1776. SCOTT, F. M. **Internal suberization of tissues.** *Bot. Gaz.* 111 (4), 1950 (378–94). 24 refs. [University of California, Los Angeles.] O.B.D.

Results of investigations into the presence of suberin in the internal surfaces of a large number of species.

1777. KRASIL'NIKOV, P. K. K voprosu o metodike izucheniya kornevÿkh sistem drevesnÿkh porod pri expeditsionnÿkh geobotanicheskikh issledovaniyakh. [**Methods of investigating the root systems of woody species during geobotanical expeditions.**] *Bot. Zh. S.S.S.R.* 35 (1), (57–67). [Russ.] [Botanicheski Institut im. V.L. Komarova Akademii Nauk SSSR, Leningrad.] P.R.

Urges the need for standard procedure in and standard records of root studies to ensure comparability of data. Stresses particularly the importance of comprehensive root studies and the necessity for careful selection of the plot to be investigated so that it should represent typical conditions of vegetation and soil: roots of associated species and soil conditions should always be recorded. Outlines the author's method of root excavation, consisting in (1) excavating to show the horizontal distribution of the root system over one-half the rooting area of the tree; (2) driving a trench across the diameter of the rooting area, passing through the stump, to show the vertical root distribution; and (3) taking, at intervals along the edge of this trench, soil monoliths from which the roots are washed out to determine the volume and weight of roots per unit volume of soil in the various soil layers.

1778. GIER, L. J. **Development of adventitious roots inside the trunks of trees.** *Transactions of the Kansas Academy of Science, Lawrence* 48 (2), 1945 (198). [William Jewell College, Liberty, Miss.] B.A.P.

Trunks of *Catalpa bignonioides* var. *nana*, removed because of an unspecified fungus disease from the campus of the Kansas State Teachers' College, Pittsburg, when split lengthwise, revealed a number of adventitious roots in the cavity formed by decay. They had developed from the upper side of the scions above the union of the graft and grew straight, or with very few branches, down the inside of the trunk. A similar phenomenon was observed in *Acer saccharinum* in Liberty, Miss. Adventitious roots up to 3 cm. in diameter had grown into the top of the trunk cavity from scar tissue round old broken snags of branches.

1779. CAMEFORT, H. Anomalies foliaires et variations phyllotaxiques chez les plantules de *Cupressus sempervirens*. [**Leaf irregularities and variations in phyllotaxy of *C. sempervirens* seedlings.**] *Rev. gén. Bot.* 57 (676), 1950 (348–71). 18 refs. [F.f.] O.B.D.

1780. CHELJADINOVA [CHELYADINOVA], A. I. La quantité des aiguilles et la nature de leur développement chez le pin. [**Quantity of needles and their manner of growth in Pine.**] *Comptes rendus de la Conférence pansoviétique de Physiologie végétale, Académie des Sciences, U.R.S.S., Moscow & Leningrad* 2, 1945 (183–9). [Russ.] *Abstr.* in *Bull. analyt. Cent. nat. Rech. sci.* (*2e Partie*) 9, 1948 (115883). [F.] O.R.S.

The weight of needles on a Pine 14 years old is much less than that on a Pine 40 years old; on the other hand, a stand of young Pines has a far greater number of needles than an older stand covering the same ground space. As a consequence the water requirements of the younger stand are far greater, owing to the higher transpiration drain resulting from the greater area of leaf surface.

1781. DOLIVO, A. Anatomie comparée des aiguilles de douze espèces de pins. [**Comparative anatomy of the needles of 12 species of Pine.**] *Bulletin de la Société Botanique de Genève* (*Ser.* 2) 39, 1948 (8–33). 13 refs. [F.f.] L.S.

1782. WYLIE, R. B. **Differences in foliar organization among leaves from four locations in the crown of an isolated tree (*Acer platanoides*).** *Proc. Iowa Acad. Sci.* 56, 1949 (189–98). 9 refs. A.P.B.

1783. MATUSZKIEWICZ, W. Uwagi o zmienności liści buka (*Fagus silvatica*) w Sudetach [**On the variability of the leaves of Beech (*Fagus sylvatica*) in the Sudeten Mountains.**] *Repr.* from *Ann. Univ. M. Curie-Skłodowska, Lublin* (*Ser. E*) 4 (10), 1949 (373–80). 8 refs. [Pol.e.]

A study of the number of lateral nerves per leaf in 1578 leaves (31 trees) of *F. sylvatica* growing in the Sudeten Mountains, confirmed the conclusion reached by Madalski [*For. Abstr.* 11 (No. 161)], viz. that the modal value of the number of lateral nerves per leaf is useless from the taxonomical point of view. The results seem to point to a geographical variability of the average values of the number of lateral nerves.

12.19. Geographical Distribution. Plant Geography and Sociology

See also *For. Abstr.* 12 (Nos. 1874, 1885, 1909, 2257–8).

1784. CRIVELLARI, D. Puglia, terra delle querce. [**Apulia, a land of Oaks.**] *Monti e Boschi* No. 8, 1950 (339–44). 5 refs. [It.f.e.]

Describes the ecological conditions and distribution in Apulia of *Quercus aegilops*, *Q. troiana*, *Q. pubescens*, *Q. ilex*, *Q. cerris*, *Q. coccifera*, *Q. farnetto*, *Q. robur* and *Q. suber*.

1785. DUNCAN, W. H. **Preliminary reports on the flora of Georgia. 2. Distribution of 87 trees.** *Amer. Midl. Nat.* 43 (3), 1950 (742–61). 4 refs. [University of Georgia, Athens.]

1786. STERNITZKE, H. S., and DUERR, W. A. **Tree distribution in Mississippi.** *For. Surv. Release Sth. For. Exp. Sta.* No. 64, 1950. pp. 19.

Includes 18 maps showing distribution of the more important species.

1787. SHARP, A. La distribución del género *Podocarpus* en México. [**The distribution of the genus *Podocarpus* in Mexico.**] *Boletín, Sociedad Botánica de México* No. 4, 1946 (17–8). 1 ref. (*Contribution of the botanical Laboratory, University of Tennessee* (*n.s.*) No. 88). [Span.] L.S.

1788. SHARP, A. Distribución del género *Podocarpus* en México. [**Distribution of the genus *Podocarpus* in Mexico.**] *Boletín, Sociedad Botánica de México* No. 8, 1949 (25–6). 1 ref. [Span.] L.S.

1789. DUCKE, A. Árvores Amazônicas e sua propagação—adaptação de frutos ou sementes de árvores Amazônicas a diversos meios de propagação em espécies de estreita afinidade botânica, porém em condições mesológicas diferentes. [**Amazonian trees and their seed dispersal—adaptation of fruit or seeds of Amazonian trees to different methods of dispersal in species of close botanical relationship but growing in different ecological conditions.**] *Separate* from *Boletim do Museu Paraense Emilio Goeldi, Belém* 10, 1948 (1949) (81–92). [Port.]

Brief notes on the morphology of the seeds and the manner of their dispersal.

12.19.1. *Regional Floras, including Check Lists*

See also *For. Abstr.* 12 (Nos. 1828 *et seq.*).

1790. MOONEY, H. **Supplement to the botany of Bihar and Orissa.** Catholic Press, Ranchi, Bihar, India. 1950. pp. 294. Price *Rs.*15 [£1 8*s.*]

1791. ANDREWS, F. W. **The flowering plants of the Anglo-Egyptian Sudan. Vol. 1 (Cycadaceae—Tiliaceae).** T. Buncle & Co. Ltd., Arbroath, Scotland, for Sudan Government. 1950. pp. lxxxvi + 237 + 1 map. Price 21*s.*

1792. AUBRÉVILLE, A. Flore forestière Soudano - guinéenne — A.O.F. — Cameroun— A.E.F. [**The Sudan-Guinea forest flora—French West Africa, French Cameroons and French Equatorial Africa.**] Sté. d'Éditions géographiques, maritimes et coloniales, 17 Rue Jacob, Paris VIe. 1950. pp. 524. Many refs. [F.] Illustrated by 115 sets of drawings and 40 distribution maps.

1793. ANDERSON, J. P. **Flora of Alaska and adjacent parts of Canada. Part VIII.**

Gentianaceae to Campanulaceae. *Iowa St. Coll. J. Sci.* 24 (2), 1950 (219–71).
Cf. *For. Abstr* 10 (No. 137).

1794. YUNCKER, T. G. **Flora of Panama. Part IV. Fascicle 1. Piperaceae.** *Ann. Mo. bot. Gdn.* 37 (1), 1950 (1–120). O.B.D.

1795. HILDEBRAND, F. H. Boomnamenlijst van Java en Madura met aantekeningen over de verspreiding, afmetingen, enz. [**List of tree species of Java and Madura, with notes on their distribution, dimensions, etc.**] *Rapp. Bosbouwproefsta., Buitenzorg* No. 35 1950. pp. 171. [Jav.Du.E.] (*Serie Boomnaamlijsten* No. 24).
A check list arranged alphabetically under (1) vernacular and commercial names, and (2) scientific names by family, genus and species. [Cf. *For. Abstr.* 12 (No. 899).]

12.19.2-3. *Vegetation Types*

See also *For. Abstr.* 12 (Nos. 1660, 1694–5, 1719, 1735, 1894, 2524, 2527, 2533, 2543).

1796. CLEMENTS, F. E. **Dynamics of vegetation: selections from the writings of Frederic E. Clements, Ph.D.** H. W. Wilson Co., New York. 1949. pp. 296. Price $3.75 [30*s.*]

1797. RICHARDS, P. W. **Climatic limits of vegetation.** *Nature, Lond.* 166 (4222), 1950 (536–8).
A résumé of papers and discussion at a joint session of the Botany and Forestry Sections at the British Association meeting at Birmingham on 1 Sept. 1950. Papers were read on the following subjects:—the climatic limits of the tropical rain forest (*Prof. P. W. Richards*); the ecological importance of accumulated temperature (*Prof. A. Austin Miller*); and the importance of climatic limitations in British forestry (*J. MacDonald*).

1798. **Tropical rain forests.** *Bibliographical Series, Science Library, Science Museum, London* No. 681, 1949. pp. 2.
A list of references from 1919, classified by U.D.C.

1799. BARTSCH, J., and BARTSCH, M. Vegetationskunde des Schwarzwaldes. [**The plant ecology of the Schwarzwald.**] Gustav Fischer, Jena. 1940. pp. x + 229. 9 pp. of refs. [G.] (Vol. 4 of *Pflanzensoziologie: eine Reihe vegetationskundlicher Gebietsmonographien herausgegeben von der Reichsstelle für Naturschutz.*) Price *DM* 13.50 [£1 5*s.* 6*d.*]

1800. LACHAUSSÉE, E. Les associations forestières du Jura français. [**The forest associations of the French Jura.**] *Bulletin de la Société Botanique de Genève* (*Ser.* 2) 39, 1948 (34–50). [F.] L.S.

1801. PAVARI, A. Commenti al lavoro di A. Giacobbe: 'Le base concrete per una classificazione ecologica della vegetazione italiana'. [**Comments on A. Giacobbe's 'Basis for an ecological classification of Italian vegetation'.**] *Repr.* from *Archivio Botanico Forlì* 26 (1), 1950. pp. 27. [It.it.e.]
Giacobbe's 'biocores', climatic units based on a combination of temperature and precipitation factors, are criticized as being insufficiently precise for the classification of Italian vegetation.

1802. HEUER, I. Vergleichende Untersuchungen an den Föhrenbeständen des Pfynwaldes (Wallis): Versuch einer biocoenologischen Analyse. [**Comparative studies of the Scots Pine woods of the Pfynwald (Valais): an essay in biocoenological analysis.**] *Beiträge zur geobotanischen Landesaufnahme der Schweiz* No. 28, 1949. pp. 185. 6 pp. of refs. [G.g.] Price *Fr.*12.50.
The first part of this dissertation examines the problem of distinguishing and classifying closely related plant communities as naturally as possible, and gives the theoretical basis of a method, put forward tentatively, for the analysis and comparison of communities according to the relationships of the component species to their environment. A list of characters is drawn up for each species, giving its 'species value' (broadly speaking, its 'goodness' as a species, its intrinsic variability etc.) 'environment type' (abiotic and biotic relationships), and 'form type' (life form, root system, pollination, seed dispersal etc.). By these criteria each species can be assigned to a 'correlation type', which may be broadly or narrowly defined, representing a group of species having similar environmental relationships. Characteristic 'correlation-type spectra' for each community can then be obtained by noting the 'correlation types' against the species list. For the present study the correlation types are based on an

assessment of the degree to which association of a species with other species is obligate or not. In the second part of the work the method is exemplified in detail by analyses for Pine woods in the Pfynwald.

1803. Goor, C. P. van. Bodem en vegetatie. **[Soil and vegetation.]** *Ned. Boschb.-Tijdschr.* 22 (2), 1950 (33–43). 20 refs. [Du.e.]

Discusses generally the relationship between plant ecology and soils, and, in more detail, plant associations of Switzerland. [Cf. *For. Abstr.* 10 (No. 2425).]

1804. Yakovlev, F. S. Sosnovÿe lesa na peschanokamennistÿkh i melovÿkh pochvakh privolzhskoy vozvÿshennosti. **[Scots Pine forests on sandy-stony and chalk soils of the Volga-region hills.]** *Bot. Zh. S.S.S.R.* 35 (3), 1950 (303–11). 9 refs. [Russ.] [Karelo-finskaya Baza Akademii Nauk SSSR, Petrozavodsk.] P.R.

Describes the chief forest types of the plateau (hardwoods, especially Pedunculate Oak, Small-leaved Lime and Norway Maple, on somewhat podzolized sandy loams), the upper terrace (more or less open Scots Pine with a second storey of some hardwoods, varying with relief and soil types—comprising sandy, stony soils, sandy loams and sandy semi-bog soils), and the lower terrace (chalk outcrop with humus-carbonate soils), to which special attention is devoted. The chief chalk types, data for which are tabulated, are: (1) Pine with an Oak/Maple/Lime understorey and Hazel in the shrub layer (*Pinetum quercetoso-coryloso-silerosum cretaceum*), (2) Pine with Oak understorey, a shrub layer of *Euonymus verrucosus* and *Prunus fruticosa*, and *Pleurozium schreberi* in the moss layer (*Pinetum quercetoso-hylocomiosum cretaceum*), and (3) Pine with a poor shrub layer of *Cytisus ruthenicus* and a ground layer of mixed herbaceous species (*Pinetum steppo-herbosum cretaceum*). Quality class of the Pine, the litter depth, and depth to solid chalk, decrease in the order (1) to (3). Erosion is absent in (1), weak in (2) and moderately severe in (3). The complex successions that have occurred after clear felling and cattle grazing are discussed, and a tabular summary is given of the main stages. Clear felling is now prohibited in these forests; fellings are designed to favour natural regeneration of the Pine, for which purpose the openings must not be so large as to encourage herbaceous growth or expose the Pine seedlings to sun-scorch. Lime and Maple must be kept down sufficiently to ensure good development of the Pine and Oak regeneration; at the same time enough must be maintained to protect the soil and to act as nurses to the main species. For afforesting open areas it is suggested that Pine and Birch should be planted on the shallower humus-carbonate and stony, sandy soils, while the deeper soils should bear Pine with Oak and other hardwoods. Pine to be grown on chalk areas should be raised from seed of the local Pine growing naturally on chalk. [Cf. *For. Abstr.* 11 (No. 1647).]

1805. Gračanin, M. Tipovi šumskih tala Hrvatske. I. Tla šumâ *Querceto-Carpinetum croaticum* i *Querceto-Castanetum croaticum*. **[Croatian forest soil types. I. Soils of the *Querceto-Carpinetum croaticum* and *Querceto-Castanetum croaticum*].** *Glasn. šumske Pokuse* 9, 1948 (95–119). 8 refs. [Croat.e.]

The following conclusions are drawn from the study:—The soils of the *Querceto-Carpinetum croaticum erythronietosum* sub-association belong to the group of moderate podzolic types. With an increase in the degree of podzolization the sub-association gets suppressed, and on intensely podzolic soils it never occurs. The author therefore concludes that the association *Q.-C. croaticum* has reached its climax on the moderately podzolized soils. The soils of the second sub-association, *Q.-C. caricetosum pilosae*, belong to the group of slightly podzolized types and represent an intermediate stage in the development of *Q.-C. croaticum* forest. The *Q.-C. staphyletosum* sub-association develops on brown and yellowish-grey eluviated carbonate soils containing $CaCO_3$ or $MgCO_3$ in all horizons. The soils have a tendency to podzolization, but this is suppressed by the bases which occur abundantly in the AC and C horizons. After the carbonates have been leached from *Q.-C. staphyletosum* soils, acidification of the eluvial horizon begins, and gradually this sub-association is replaced, first by *Q.-C. caricetosum pilosae*, and later by *Q.-C. erythronietosum*. On non-carbonate diluvial, 'levantine' and other sediments the initial stage of *Q.-C. croaticum* forest begins on slightly podzolized soils, probably with the *Q.-C. caricetosum pilosae* sub-association.

The *Querceto-Castanetum croaticum* association develops in Croatia mainly on intensely podzolized soils, the adsorption saturation complex of their eluvial horizon (V) being less than 35%. The initial phase of this association's development occurs on moderately podzolized soils, on which *Q.-Carpinetum croaticum* forest is to be found in its final stage. The intensely podzolized soils represent the final phase in the development of podzolic types. A tendency to podzolization exists throughout continental Croatia, but various phases are to be found in different places.

Carpinus betulus flourishes in a fairly wide range of soil reaction, i.e. pH 5·0–7·0. *Quercus sessiliflora* grows well within a range of pH 4·0–6·5, but also on neutral to slightly alkaline soils. *Castanea sativa* prefers a more acid soil. In the *Q.-Castanetum croaticum* associations the pH varied from 4·0 to 5·9, but never exceeded 6·0.

Nitrates were not found at all in the soil types of the *Q.-Castanetum croaticum* forests; they appear only rarely in the soils of *Q.-Carpinetum erythronietosum*, but are of general occurrence in *Q.-Carpinetum staphyletosum* soils.

In the phase of brown and yellowish-grey carbonate soil degradation, considerable changes take place in the plant composition both according to the ecological trends in the vegetation and to physico-chemical changes in each soil horizon. In the first phase slight acidification of the surface horizons occurs while the illuvial horizon long retains a neutral or slightly alkaline reaction. Short-rooted alkalophilous vegetation finally disappears from such sites, but it is possible to find both alkalophilous and acidophilous vegetation existing on them side by side. Analogous conditions are often found in the progressive stage of podzolic development.

1806. JOVANOVIC, B. Prilog poznavanju dendroflore šumskih asocijacija Majdanpečke Domene. **[Tree species and communities of the state forest of Majdanpek.]** *Godišnjak Poljoprivedno-Šumarskog Fakulteta, Beograd* 1, 1948 (301–26 + 4 photos). [Serb.russ.f.] E.M.B.

Deals with the climate, soil, tree communities and tree species of a forest in north-eastern Serbia, a region where *Fagus moesiaca* [cf. *For. Abstr.* 11 (No. 161)] is increasingly gaining ground. The Majdanpek state forest, ranging in altitude from 200–800 m., represents the lower altitudinal limits of Beech. It is bounded below by the *Quercus sessiliflora/Q. cerris* belt. Being near the lower limit of its range, the Beech is greatly influenced by topography, and is replaced over about a third of the forest by associations of *Q. sessiliflora*, *Q. sessiliflora/Carpinus betulus*, *Fraxinus excelsior/Acer pseudoplatanus*, and *Fraxinus ornus/Acer monspessulanum*. The forest flora is very varied and contains about 70 different tree and shrub species. The author notes the necessity for similar ecological studies throughout Serbia as a basis for the conservation of the old forests and the creation of new plantations.

1807. TAKAHASHI, K. Die Baum- und Waldgrenze im Hida-Gebirge (japanische Nordalpen). Ein Beitrag zur Baum- und Waldgrenze Ostasiens. **[Tree and forest limits in the Hida range [Honshu]. A contribution to the study of tree and forest limits in eastern Asia.]** *Repr.* from *Japanese Journal of Botany, Tokyo* 13, 1944 (269–343). Numerous refs. [G.] [Botanical Institute, Kyoto Imperial University, Kyoto.]

1808. PURI, G. S. **Soil pH and forest communities in the Sal (*Shorea robusta*) forests of the Dehra Dun valley, U.P., India.** *Indian For.* 76 (7), 1950 (292–309 + 2 photos, 1 dgm., 18 tbls., 1 map). 13 refs.

A detailed study was made of 5 sites. It was found that *Shorea* occurs only on Siwalik clays and conglomerates, forming *Shorea/Eugenia* and *Shorea/Ougeinia* communities. On new soils, *Shorea* communities are not present. Regeneration is best on clays; on shallow clays with conglomerate near the surface, or in bouldery soils, regeneration of this species is less frequent. On the whole, the *Shorea/Eugenia* communities with a high % of *Shorea* were on the more acid soils, and the pH of the soil showed an increase in *Shorea/Ougeinia* communities, especially in those with a smaller % of *Shorea*. In miscellaneous communities with no *Shorea*, pH of the soils was generally more alkaline. Over-felling and/or frequent burning of *Shorea* forests even on clays seems to result in increase of soil pH, and on these soils no *Shorea* seedlings were found. It seems possible that increase of pH of the surface soils has something to do with whatever

factors are responsible for failure in regeneration of this species which, in the areas where it is now dominant, appears to be, not a climatic climax, but a bio-edaphic seral association maintained by human influence.

1809. KADAMBI, K. **Evergreen montane forests of the western ghats of Hassan district Mysore.** *Indian For.* 76 (3), 1950 (121–32). 10 refs.

1810. MOUTERDE, P. La végétation arborescente des pays du Levant. [**The woody vegetation of the Levant.**] *Publications techniques et scientifiques de l'École Française d'Ingénieurs de Beyrouth* No. 13, 1947. pp. 54 + 8 plates. 15 refs. [F.] L.S.

A short description, with a more detailed study of the individual species, and lists of scientific and French and Arabic vernacular names.

1811. RUXTON, J. P. **A preliminary note on the vegetation of Gambia.** *J. Oxf. Univ. For. Soc.* (*Ser.* 3) No. 4, 1949 (35–40).

1812. LEBRUN, J. Exploration du Parc National Albert: Mission J. Lebrun (1937–1938): Fasc. 1. La végétation de la plaine alluviale au sud du Lac Édouard. [**Exploration of the Albert National Park** [**Belgian Congo**]: **J. Lebrun expedition** (**1937–8**): **Fasc. 1. Vegetation of the alluvial plain to the south of Lac Édouard.**] Institut des Parcs nationaux du Congo Belge, Brussels. 2 vols. 1947. pp. 800 + 104 photos, 2 maps. 382 refs. [F.] [Price £7. 18*s*.]

1813. RAMIREZ CANTU, D. Notas generales sobre la vegetación de la Sierra de Tepoztlan, Morelos. [**General notes on the vegetation of the Tepoztlan mountains, Morelos.**] *An. Inst. Biol. Univ. Méx.* 20 (1/2), 1949 (189–228). 13 refs. [Span.] C.G.B.

1814. CORE, E. L. **Notes on the plant geography of West Virginia.** *Castanea* 15 (2), 1950 (61–79). [West Virginia University, Morgantown.]

1815. BROWN, R. T. **Forests of the central Wisconsin sand plains.** *Abstr.* in *Bull. ecol. Soc. Amer.* 31 (3), 1950 (56). [University of Wisconsin.] A.P.B.

The southern border of the range of Jack Pine in Adams and Juneau counties has advanced southward since 1851. Species composition in Adams county has not changed noticeably, but the density has much increased.

1816. MCINTOSH, R. P., and CURTIS, J. T. **The upland hardwoods continuum of southwestern Wisconsin.** *Abstr.* in *Bull. ecol. Soc. Amer.* 31 (3), 1950 (56).

Tree composition of 95 stands of upland hardwoods in the S.W. half of Wisconsin.

1817. JENKINS, D. W. **Northern extension of the Maple-Basswood forest during the xerothermic period.** *Abstr.* in *Bull. ecol. Soc. Amer.* 31 (3), 1950 (53–4). A.P.B.

Analyses of relict outposts of deciduous vegetation in northern Minnesota, Western Ontario and eastern Manitoba indicate that the Maple/Basswood forests once extended farther north than their present range.

1818. SOBRINHO, V. As regiões naturais de Pernambuco o meio e a civilização. [**The natural vegetation zones of Pernambuco, the environment and civilization.**] *Publicaçao, Instituto de Pesquisas agronômicas, Secretaria de Agricultura, Indústria e Comercio do Estado de Pernambuco, Rio de Janeiro* No. 2, [1949?]. pp. 219 + 1 map. [Port.]

A description of the natural vegetation zones, climate, soil and waterways, with a discussion of some of the state's economic problems.

1819. TESDORFF, H. Die argentinischen Urwälder der Süd-Kordillere. [**Virgin forests of the Southern Cordilleras, Argentina.**] *Weltholzw.* 2 (8), 1950 (155–8). 1 ref. [G.] P.R.

Some account of the virgin forests of the Southern Andes region based on Rothkugel's 'Los bosques patagónicos' (1916) and on recent sample-plot enumerations. The economically utilizable forests form 3 zones: (1) *Araucaria araucana* forests, extending from 38° 50′ to 39° 50′ S. lat.; (2) mixed *Nothofagus* forests (*N. dombeyi, N. procera, N. pumilio*, and *N. obliqua*), 39° 50′–40° 30′; (3) *Nothofagus dombeyi, N. pumilio* and *Libocedrus chilensis*, 40° 30′–42° 30′.

1820. ANDREAS, C. H. Landschappen en plantengroei van Chili. [**Landscapes and**

vegetation in Chile.] *Nederlandsch Kruidkundig Archief, Amsterdam* No. 56, 1949 (43–7). [Du.] (*Verslagen en Mededelingen der Koninklijke Nederlandsche Botanische Vereeniging over de jaren 1944 en 1945.*) A.P.B.

1821. SPECHT, R. L., and PERRY, R. A. **The plant ecology of part of the Mount Lofty ranges.** *Transactions of the Royal Society of South Australia, Adelaide* 72 (1), 1948 (91–132 + 5 plates + 2 maps). 24 refs. L.S.

A study of the topography, geology, climate, soils and vegetation.

12.19.4. *Succession*

See also *For. Abstr.* 12 (Nos. 1693–4, 1729, 1735, 1796, 1804–5, 1808, 1815, 1817, 1869–70, 1914, 1963, 1986, 2298).

1822. PURI, G. S. **The vegetation of some disused quarries at Ingleton, Yorkshire, England.** *Repr.* from *J. Indian bot. Soc.* 28 (4), 1949 (212–20). 6 refs.

The data presented show that on the calcareous wastes, where trees are mainly Hazel and Ash, the soil has high base status. The decrease in the % of Ash from the lower to the upper parts of these wastes follows more or less closely the changes in base status and pH of the soil. On the non-calcareous wastes, Ash and Hazel occur only on the lower parts of the older wastes; on the younger wastes, where 70% of the samples studied were base-deficient, Ash trees were not present at all though Ash seedlings were abundant on lower parts of the wastes where soil was usually of a higher pH. Thus it appears that the distribution of Ash is correlated with high base status and high pH of the soil. [Cf. *For. Abstr.* 11 (No. 902).]

Another point revealed by this investigation was that the earliest colonists on these wastes always included trees, and it is concluded that the distribution of pioneers is related to soil properties and does not follow a fixed order from lower to higher and from smaller to larger plants as is often supposed.

Although Oak is a dominant species in the surrounding woods, it is absent in the colonizing stages on the quarry wastes, where the commonest species of shrubs and trees are those whose seed is wind- or bird-carried.

1823. ASHLEY, R. H. **Invasion and development of natural vegetation on spoil banks in Central Pennsylvania.** *Abstr. of thesis* in *J. For.* 48 (9), 1950 (400). [Dept. of Forestry, Pennsylvania State College.]

The theory is advanced that the success and composition of plant communities on this type of spoil bank is determined within the first 3–4 years after strip-mining of coal. If by this time barren areas are still present, they are not likely, on account of soil eluviation, to be occupied by any succeeding waves of invaders for at least 25 years.

1824. KOLAKOVSKI, A. A. K voprosu o vymiranii Pitsundskoy sosnovoy roshchi. **[On the problem of the dying-out [of Pine] in the Pitsunda *Pinus pithyusa* grove.]** *Bot. Zh. S.S.S.R.* 35 (3), (284–91). [Russ.] P.R.

Agrees with previous authors in attributing the regression of Pine (*Pinus pithyusa*) in this forest, to a natural succession to Hornbeam (*Carpinus orientalis*). The objects of management should be to preserve part of the area for study in its natural state and to manage the other part so as to preserve the Pine both by natural and, if necessary, by artificial regeneration. Important measures to aid regeneration are removal of the moss and litter layers, thinning of the shrub layer and removal of undesirable shrub and ground vegetation.

12.2. *Special (Systematic) Botany*

See also *For. Abstr.* 12 (Nos. 1790–5).

12.21. Fungi

See also *For. Abstr.* 12 (Nos. 1863, 2050–7, 2335–63).

1825. SHAFER, T., and LIMING, O. N. ***Ceratostomella ulmi* types in relation to development and identification of perithecia.** *Phytopathology* 40 (11), 1950 (1035–42). 8 refs. [U.S. Dep. Agric., East Orange, N.J.]

Results of a study of several isolates from different parts of the U.S.A. for their ability to produce perithecia, alone or paired, on Elm wood, and for their cultural and morphological characters.

1826. SIGGERS, P. V. **Possible mechanism of variation in the imperfect stage of**

Scirrhia acicola. *Phytopathology* 40 (8), 1950 (726–8). 3 refs. [Division of Forest Pathology, Bureau of Plant Industry, Soils and Agricultural Engineering.]

Presents observations on germ-tube fusions between different conidial cells, hyphal fusions, and a breaking up of the multi-cellular conidia at the septa, observed in the fungus causing the brown-spot needle blight of Pines.

1827. BATKO, S. **A note on the distribution of *Poria obliqua* (Pers.) Bres.** *Trans. Brit. mycol. Soc.* 33 (1/2), 1950 (105–6 + 1 plate). 3 refs. O.B.D.

P. obliqua, found in 1939 on Birch in Scotland, has since been recorded on *Betula pubescens* in Perthshire (1948), along the banks of the River Dee between Braemar and Inverey (1948), and in Cumberland (1949). [Cf. *For. Abstr.* 1 (241).]

12.25. Gymnosperms

See also *For. Abstr.* 12 (Nos. 1762, 1787–8, 1895).

1828. JAURÈS, R., and FERRÉ, Y. DE. **À propos des *Larix* d'Amérique du Nord. [The Larches of North America.]** *Trav. Lab. for. Toulouse* 1 (4) Art. 33, 1949. pp. 16. 10 refs. [F.]

Recognizes the following:—*Larix lyallii, L. occidentalis, L. intermedia, L. laricina parvistrobus, L. alaskensis, L. laricina typica* and *L. laricina lutea.*

1829. MARTINEZ, M. Las pseudotsugas de Mexico. **[*Pseudotsuga* in Mexico.]** *Boletín, Sociedad Botánica de México* No. 8, 1949 (21–4). [Span.] L.S.

12.26-8. Dicotyledons

See also *For. Abstr.* 12 (Nos. 1766, 1772–4, 1783, 1885).

1830. CHATTERJI, R. N., and RAIZADA, M. B. **New or little known plants from Assam.** *Indian For.* 74 (11), 1948 [1950] (385–92 + 2 drawings).

1831. CUATRECASAS, J. **New and noteworthy Colombian trees.** *Trop. Woods* No. 96, 1950 (37–47).

Describes some species of Linaceae, Quiinaceae and Ochnaceae.

1832. WIT, H. C. D. DE. **Spicilegium Malaianum.** *Bulletin of the Botanic Gardens, Buitenzorg* (*Ser. 3*) 18 (2), 1949 (181–212). L.S.

Includes a provisional key to the Malaysian species of *Trema*, botanical and taxonomic notes on *Eusideroxylon* spp. occurring in the Netherlands East Indies, and brief notes on *Dillenia suffruticosa* and *Kingiodendron.*

1833. SLOOTEN, D. F. VAN. **Sertulum Dipterocarpacearum Malayensium. IV.** *Bulletin of the Botanic Gardens, Buitenzorg* (*Ser. 3*) 18 (2), 1949 (229–69). L.S.

Describes species of *Shorea* (including some new species) and their distribution in the Malay Peninsula and Netherlands East Indies.

1834. PAVARI, A. Note su *Acer lobelii* Ten. **[Note on *Acer lobelii*.]** *Repr.* from *Nuovo G. bot. ital.* 56 (4), 1949 (535–56 + 3 photos). 12 refs. [It.it.e.]

The author shows that *A. lobelii* is a separate species, not a variety of *A. platanoides.*

1835. MUKHERJEE, S. **Wild Mangoes of India.** *Sci. & Cult.* 15 (12), 1950 (469–71). 14 refs. D.S.I.R.

Nine types of fruits of *Mangifera sylvatica* and 3 types of *M. indica* were found in north-eastern India (Assam, Kalahandi). The fruits of wild Mango are of various shapes, like those of cultivated varieties, and they attain sometimes the size of the latter fruits. It appears likely that hybridization in nature between the two species has played an important part in the evolution of Mangoes. *From author's summary.*

1836. JESSUP, R. W. **The salt bushes of S. Australia.** *World Crops* 2 (6), 1950 (266–7). [Dep. Agric. S. Australia.] From *Journal of Agriculture of S. Australia, Adelaide* 53, 1949 (4). O.R.E.

Describes the most important species of *Atriplex*, potentially useful soil conservers, with advice on methods of sowing.

1837. KEAY, R. W. J. **[Botanical] notes on Tropical West African species of *Combretum*. I.** *Kew Bull.* No. 2, 1950 (245–54).

1838. KEAY, R. W. J. **The systematic position of suffrutescent species of *Combretum* Loeffl.** *Kew Bull.* No. 2, 1950 (255–7). 3 refs.

1839. CAMUS, A. Sur deux espèces asiatiques affines du genre *Quercus*. **[Two closely connected Asiatic species of the genus *Quercus*.]** *Phanérogamie* 13 (4), 1948 (262). [F.] O.B.D.

Distinguishes 2 varieties of *Quercus lanata*: *Q. l.* var. *eriocarpa* and *Q. l.* var. *leiocarpa*. *Q. franchetii* is often confused with these, but is distinct.

1840. LLENSA DE GELCÉN, S. Sistemática, fitogeografía, y utilidad forestal del híbrido × *Quercus morisii* Borzi. **[Systematics, geographical distribution and forestry value of the hybrid × *Quercus morisii* Borzi.]** *Anales de la Escuela de Peritos Agrícolas y Superior de Agricultura y de los Servicios Técnicos de Agricultura, Barcelona* 3 (1/4), 1943 (315–28). [Span.] L.S.

Discusses the hybrid, a cross between *Quercus ilex* and *Q. suber*, its nomenclature, botanical characters and distribution. Although the hybrid grows rapidly, its cultivation is not commercially desirable, either for cork or timber. Its presence in Cork Oak stands is in fact to be discouraged, since degeneration in the stands may result from back crossing. Mixed stands of *Q. suber* and *Q. ilex*, with the resultant possibility of hybridization, are therefore undesirable.

1841. MANNING, W. E. **A key to the Hickories north of Virginia with notes on the two Pignuts *Carya glabra* and *C. ovalis*.** *Rhodora* 52 (620), 1950 (188–99). [Bucknell University, Lewisburg, Pa.] O.B.D.

1842. LEONARD, J., and LATOUR, J.-M. Les espèces congolaises du genre *Schefflerodendron* (Papilionaceae). **[The Congo species of *Schefflerodendron* (Papilionaceae).]** *Bull. Soc. Bot. Belg.* 82 (2), 1950 (295–301). [F.]

Describes 4 species, including a new species *S. gilbertianum*.

1843. VERDCOURT, B. **Notes on the genus *Bersama* in Africa.** *Kew Bull.* No. 2, 1950 (233–44). 6 refs.

A botanical study.

1844. **[Diagnostic value of bark for identification of genera of Myristicaceae.]** *Rep. For. Adm. Malaya* 1950 (11).

Detailed bark and blaze descriptions of over 150 non-dipterocarp tree species were made during the year. In general they are very constant and often distinctive specifically, and should prove of great value for identification in the field. There is every hope that it will be possible to differentiate between the various genera of the Myristicaceae (*penarahan*) on bark characters alone. This is of considerable economic importance, as the majority of Malayan timber-producing species of *penarahan* belong to the one genus *Myristica*.

1845. PERRY, L. M. **Notes on some Myrtaceae of Fiji.** *J. Arnold Arbor.* 31 (4), 1950 (350–71).

Includes descriptions of some new species of *Syzygium*.

1846. FLODERUS, B. **Salicological studies.** *Svensk bot. Tidskr.* 44 (1), 1950 (94–5). [E.] O.B.D.

Reaffirms the validity of *Salix appendiculata*, *S. elaeagnos*, and presents a new section *Salices japonicae*.

1847. STEENIS, C. G. G. J. VAN. **Notes on the genus *Wightia* (Scrophulariaceae).** *Bulletin of the Botanic Gardens, Buitenzorg (Ser. 3)* 18 (2), 1949 (213–27). L.S.

Taxonomy, botany, ecology and distribution in the Malay Peninsula and Netherlands East Indies.

1848. KOBUSKI, C. E. **Studies in the Theaceae. XX. Notes on the South and Central American species of *Laplacea*.** *J. Arnold Arbor.* 31 (4), 1950 (405–29).

[Cf. *For. Abstr.* 12 (No. 203).] Includes descriptions of some new species and combinations.

1849. WENT, J. C. Iepennomenclatuur. **[Nomenclature of Elms.]** *Ned. Boschb.-Tijdschr.* 21 (4), 1949 (106–8). 5 refs. [Du.]

Criticizes the names adopted for *Ulmus* spp. in the list of the most important woody species of Holland [*For. Abstr.* 11 (No. 817)] and suggests alternatives.

13. FOREST ZOOLOGY

See also *For. Abstr.* 12 (Nos. 2058–63, 2182–9, 2298, 2366–2457, 2544–6).

1850. WELLINGTON, W. G. **Effects of radiation on the temperatures of insectan habitats.** *Repr.* from *Sci. Agric.* 30, May

1950 (209–34). 29 refs. (*Contr. Div. Ent. Dep. Agric. Can.* No. 2645).

[Cf. *For. Abstr.* 10 (No. 2274), 11 (Nos. 1485–6, 2321).] The observed differences between insect temperatures and the temperatures of the parts of plants on which they feed, on the one hand, and the temperature of the surrounding air, on the other, are sufficiently large to be given serious consideration in field studies. The differences observed are largely a result of radiant heating by day and radiant cooling by night. Under winter conditions, when the sun is at low elevations, heating is still sufficient to raise exposed coniferous foliage more than 2° C. above the surrounding air at latitude 46° 30′. By night, exposed foliage radiates down as much as 0·8° below the air temperature under a clear sky. Snow-covered foliage remains above the air temperature on clear, calm nights, and below it during sunny days. This damping of daily fluctuations means that insects overwintering on branches beneath snow cover may experience about 8° less total change per day than insects on exposed branches. Summer conditions give results somewhat similar to those observed during the winter, but values differ in degree. More intense incoming radiation by day raises vegetative parts as much as 8° above surrounding air, and more rapid rates of outgoing radiation at higher night temperatures reduce vegetation temperatures as much as 3° below the surroundings under a clear sky.

Wind does not markedly modify temperatures elevated by radiant heating, but it affects radiant cooling at night, particularly in winter when the rate of cooling, at generally low temperature levels, is below that prevalent under summer conditions.

Winter cloud by day keeps exposed foliage slightly above air temperature, and by night re-emitted radiation from low cloud raises foliage temperatures fractionally above the air. Summer cloud by day permits elevation of foliage temperatures to 2° above the air. At night, an overcast seldom maintains foliage temperatures a significant amount above the surrounding air. When isolated clouds obscure the sun, but not the rest of the sky, at any season, foliage radiates to levels below air temperature. Similarly, foliage exposed to the sky, but shielded from the sun, cools by radiation. If broken cloud is present, diffuse radiation keeps such foliage from cooling.

Spruce budworm larvae in their natural webs experience temperatures up to 8° above ambient conditions in midsummer. Different parts of trees differ in their capacities to respond to radiant heating. Staminate flowers of coniferous trees are commonly at temperatures 5° to 8° above vegetative buds in sunlight. Since the buds, in turn, are above air temperature, this is an important difference for insects with habits like those of the Spruce budworm. The silken tents constructed by colonial species trap air which frequently ranges 8° to 13° above outside air in full sunlight. *From author's summary.*

1851. Becker, H. Untersuchungen über das Mikroklima einiger Blattgallen. [**Investigations of the microclimate of some leaf galls.**] *Anz. Schädlingsk.* 23 (9), 1950 (129–31). 9 refs. [G.g.] [Staatliches Weinbauinstitut, Freiburg-Br.]

Results of thermo-electric studies on several kinds of gall, including *Pediaspis aceris* on *Acer pseudoplatanus*, *Diplolepis divisa* on Oak, and *Mikiola fagi* on Beech. The development of the insect depends chiefly on the temperature of the gall itself, which, during insolation, is often higher than the air temperatures.

1852. Cameron, J. M. **The laboratory of insect pathology Sault Ste. Marie, Ontario.** *Bi-m. Progr. Rep. For. Insect Invest. Dep. Agric. Can.* 6 (4), 1950 (1–7).

A description of the newly opened laboratory, with some account of the various lines of research to be pursued there.

1853. Bergold, G. H. **The multiplication of insect viruses as organisms.** *Repr. from Canad. J. Res.* 28*E*, 1950 (5–11 + 4 plates). 18 refs.

The organisms studied are those causing the polyhedral diseases of *Bombyx mori*, *Choristoneura fumiferana* and *Porthetria dispar* [cf. *For. Abstr.* 12 (No. 2444)], and the capsule disease of *Cacoecia murinana*.

1854. Jahn, E. Die Polyederkrankheit des grauen Lärchenwicklers. [**The polyhedral disease of the grey Larch tortrix.**] *Pflanzenschutzberichte, Vienna* 3 (3/4), 1949 (33–41). 10 refs. [G.e.] I.I.E.

Describes microscope studies of larvae suffering from the polyhedral disease that caused the collapse of the *Grapholitha* [*Semasia*]

diniana outbreak in the Tyrol in 1947. [Cf. *For. Abstr.* 12 (No. 2452).]

1855. MORETON, B. D. **Guide to British insects.** Macmillan & Co., Ltd., London. 1950. pp. vii + 188. Price 8*s.* 6*d.* P.R.

Includes sections on: structure and life-history of insects, and key to the orders described; also an alphabetical list of insect orders, list of books for further reading, a glossary of technical terms and an index of popular and scientific names.

1856. **Bionomics and control of Malayan Bostrychidae.** *Rep. For. Adm. Malaya* 1950. (14).

In Malaya, the family Bostrychidae is represented by rather few species and only 3 (*Minthea rugicollis*, *Heterobostrychus aequalis*, and *Xylopsocus capucinus*) are responsible for the bulk of the damage to woodwork in buildings. The occurrence of *Lyctus brunneus* as an established species in Malaya is very doubtful; it is found occasionally and is probably being continuously imported, but apparently finds climatic conditions unsuitable.

1857. BREUNING, S. Descriptions de nouveaux Lamiaires de l'Inde (Coleoptera: Lamiidae). [**Descriptions of new longhorn beetles belonging to the family Lamiidae.**] *Indian For. Rec.* 7 (8), 1950 (255–65). [F.]

Describes 30 new species—7 of *Pothyne*, 1 of *Trichopothyne*, 2 of *Hyllisia*, 6 of *Glenea* and 14 of *Nupserha*.

1858. BECKER, G. Beiträge zur Ökologie der Hausbockkäfer-Larven. [**The ecology of larvae of the house longhorn beetle.**] *Z. angew. Ent.* 31 (1), 1949 (135–74). 44 refs. [G.g.]

A study of temperature, humidity and nutritional requirements. [Cf. *For. Abstr.* 11 (No. 1900).]

1859. ROBERT, FR. A. **Parasites of the weevils of the genus *Magdalis*.** *Rep. Dep. Lds. For. Quebec 1947–8*, 1949 (136).

1860. ROBERT, FR. A. **Native Elm bark beetle (*Hylurgopinus rufipes* Eich.).** *Rep. Dep. Lds. For. Quebec 1947–8*, (131–3).

Account of the life cycle derived from laboratory observations.

1861. **Bionomics of Scolytidae and Platypodidae.** *Rep. For. Adm. Malaya* 1950 (12).

Studies were made of the influence of moisture content of wood on infestation by ambrosia beetles. It appears that, in general, under Malayan conditions, timber ceases to be attractive to ambrosia beetles when its moisture content falls to *ca.* 40%. Down to 20%, adult beetles may survive for some time, but they do not breed, and eventually die in their galleries. The conditions are, however, complicated by the humidity of the surrounding air. Thus a small log with a moisture content of *ca.* 25% lying among damp humus in a shaded situation, was found to contain numerous eggs, larvae, pupae, and adults of *Xyleborus nudibrevis*, but when the log was removed to a fairly dry room, all stages died within 2 days. The danger of introduction of Malayan ambrosia beetles to the principal timber-importing countries, therefore appears to be negligible.

1862. **Bionomics of *Xyleborus testaceus* Walk.** *Rep. For. Adm. Malaya* 1950 (12–3).

This, the most abundant species of ambrosia beetle in the eastern tropics, is indigenous in Malaya, where it occurs under a considerable range of conditions from coastal Mangrove swamps to an altitude of *ca.* 4,000 ft., and has been recorded on 31 species of host trees belonging to 15 very diverse families. It has not been recorded from healthy, standing trees, but will attack through injured or diseased bark. It readily attacks freshly sawn timber but does not appear to be attracted to timber unless sapwood is present. Development from egg to adult can take place in 4–5 weeks, but the young adults remain feeding in the galleries for some time, and swarming usually occurs some 8 weeks after initial attack. The adult lays batches of eggs at intervals of a few days for about a month, so that all stages from eggs to young adults are frequently found together in the galleries.

1863. BAKSHI, B. K. **Fungi associated with ambrosia beetles in Great Britain.** *Trans. Brit. mycol. Soc.* 33 (1/2), 1950 (111–20 + 3 plates). 15 refs. [Forest Research Institute, Dehra Dun.] O.B.D.

Ceratocystis piceae, *Leptographium lundbergii* and *Oedocephalum lineatum* sp. nov. were isolated from galleries of *Trypodendron lineatum* infesting conifers in Scotland. *C. ambrosia* sp. nov. was isolated from tunnels of *Trypodendron domesticum* infesting *Betula alba*, also in Scotland. *L. lundbergii* is recorded in

Britain for the first time. It is a strong bluing agent in coniferous timber. *C. piceae* has a weak capacity for bluing wood. The appearance of the beetle tunnels and the fungi, the behaviour of the beetles, and the nature of the symbiotic relationship are described and discussed. *From author's summary.*

1864. MATHUR, R. N. **The puparia of some Indian Tachinidae (Diptera) III.** *Indian For. Rec.* (*n.s.*) *Entomology* 8 (1), 1950. pp. 6 + 1 set of drawings.
Cf. *For. Abstr.* 3 (38).

1865. BALCH, R. E. **Flights of Balsam twig aphid detected from aeroplanes.** *Bi-m. Progr. Rep. For. Insect Invest. Dep. Agric. Can.* 6 (5), 1950 (1).
Large flights of *Mindarus abietinus* were encountered at altitudes from 500 to 5,000 ft. Small buoyant insects of this kind can be carried considerable distances in horizontal air currents after being lifted by convection currents. Although proof of ability to survive at high altitudes is lacking, these observations suggest that mass 'flights' occur in the upper air in warm weather with light winds and thus ensure the wide distribution and intermingling of populations of such species.

1866. MATHUR, R. N. **Immature stages of *Psylla cedrelae* Kieffer (Homopt., Psyllidae).** *Ent. mon. Mag.* 86 (1035), 1950 (226–7). [Forest Research Institute, Dehra Dun.]

1867. MCNEILL, W. M. **Braconids from Pine cones.** *Scot. For.* 4 (3), 1950 (64).
One specimen each of *Calyptus mucronatus* (a parasite of *Pissodes validirostris*) and *Bracon concolor* was found in two samples of *Pinus sylvestris* seed collected in Aberdeenshire.

1868. PANT, G. D., and CHATTERJEE, N. C. **A list of described immature stages of Indian Lepidoptera. Part 1. *Rhopalocera.*** *Indian For. Rec.* (*n.s.*) *Entomology* 7 (7), 1950 (215–55).

1869. COWAN, I. MCT., HOAR, W. S., and HATTER, J. **The effect of forest succession upon the quantity and upon the nutritive values of woody plants used as food by moose.** *Canad. J. Res.* 28*D* (5), 1950 (249–71). 15 refs. P.R.
Quantity of available palatable browse, vitamin content of available trees and shrubs, and moisture, protein, carbohydrate, ether extractive, and total mineral content, were determined for 3 stages in forest succession in British Columbia, in order to explain the cause of the moose reaching its greatest population in the young second-growth areas and its decline as the forest approaches its climax stage. It was determined that, with the exception of carotene and possibly of total mineral content, all other factors (qualitative and quantitative) are more favourable in the younger forest areas than in the older ones. *From authors' abstract.*

1870. LEOPOLD, A. S. **Deer in relation to plant successions.** *J. For.* 48 (10), 1950 (675–8).
The present paper attempts to define the ecological bases which determine shifts of deer abundance, and to relate them to current practices in U.S. game management. The present abundance, and even over-stocking, of deer is attributed to the wholesale destruction of forests; young growth on logged and/or burned-over land provides the optimum food supply for deer.

1871. BAILEY, R. A. **Reading rabbit population cycles from Pines.** *Wisconsin Conservation Bulletin, Madison* 11 (7), 1946 (14–7). B.A.P.
A method of estimating population densities over a number of years from the age groups of trees (in this case mainly White Pine), which have escaped rabbit damage.

2. SILVICULTURE

1872. TURC, L. L'aménagement des bois de sapin de Franche-Comté. **[The [history of the] management of the Fir woods of Franche-Comté.]** *Rev. for. franç.* No. 9, 1950 (445–7). [F.]
Based on official documents.

21. SILVICULTURAL CHARACTERS OF TREE SPECIES

See also *For. Abstr.* 12 (Nos. 1749–51, 2257–8, 2504).

1873. BOLTON, LORD. **The place of**

hardwoods in Pennine forestry. *Quart. J. For.* 44 (4), 1950 (202–6 + 4 photos).

Describes the different types of soil to be found on the Yoredale measures of the Pennines, from the moor-edge land at the top to the moraine deposit at the bottom, and discusses the choice of species for each. The importance of hardwoods, and particularly of Ash and Sycamore [*Acer pseudoplatanus*], is stressed. The capacity of these species for rooting in fissured limestone with little or no soil covering renders them a valuable admixture for Larch plantations, to which they make available nutrients not accessible to the latter species. Japanese Larch does not do well on the Pennine limestone, and only European Larch should be planted. On the sandy, gravelly moraine soil of the valley bottoms Oak, Chestnut, Beech and Douglas Fir do excellently. Larch is very liable to canker in such situations. [Cf. *For. Abstr.* 11 (No. 1713).]

1874. BOUDY, P. Économie forestière nord-africaine: Tome 2. Monographies et traitements des essences forestières. Fasc. I, II. **[Forestry in [French] North Africa: Vol. 2. Monographs [on silvicultural characters] and management of forest species. Fasc. I, II.]** Éditions Larose, Paris. 1950. pp. xviii + 878 + 71 plates. [F.] [Price £2. 16*s*.]

Fascicles 1 and 2 of Vol. 2 contain exhaustive monographs on the silvicultural characters, distribution, ecology, management, diseases, pests, exploitation, yield etc. of the following species:—*Quercus suber* (pp. 29–251), *Q. faginea* (252–291), *Q. afares* (292–6), *Q. toza* (297–8), *Q. ilex* (299–377), *Q. coccifera* (378–81), *Argania spinosa* (382–416), *Pistacia atlantica* (417–9), *Acacia gummifera*, *A. raddiana*, and *A. seyal* (420–35), minor broadleaved species (436–52), Eucalypts (453–528), *Cedrus atlantica* (529–638), *Pinus halepensis* (639–90), *P. pinaster* (691–702), *P. pinea* (703–4), *P. nigra* (704), *Abies pinsapo* (704–5), *Callitris articulata* (706–39), *Juniperus phoenicea*, *J. thurifera* and *J. oxycedrus* (740–63), *Cupressus sempervirens* (764–72.) There is also a section on Esparto Grass (*Stipa tenacissima*) (777–818), and addenda to Vol. 1. [Cf. *For. Abstr.* 10 (No. 2405).]

1875. PRASAD, J. ***Aleurites fordii*, Hemsl.** *Indian For. Rec.* (*n.s.*) *Silv.* 8 (1), 1949. pp. 33 + 4 photos. 26 refs.

General description, silviculture, diseases and pests.

1876. JAGOE, R. B. **Beneficial effects of some leguminous shade trees on grassland in Malaya.** *Malayan Agricultural Journal, Kuala Lumpur* 32 (2), 1949 (77–87). A.P.B.

Results of trials of pasture grass growing with and without Rain Trees (*Enterolobium* (*Pithecellobium*) *saman*) are tabulated. They indicate that yield and quality of grass are improved in areas planted with trees fairly widely spaced. Triangular spacing at 100 ft. is recommended for *E. saman*. Analyses of grass grown under leguminous and under non-leguminous trees show higher moisture and protein content for the former. An area has been planted for long-term experiments. Other species suggested are: *Enterolobium cyclocarpum*, *Parkia* spp., *Albizzia odoratissima*, *A. fastigiata* and *Peltophorum ferrugineum*. [Cf. *For. Abstr.* 12 (No. 2257).]

21.0. *Adaptability to the General Environment. Acclimatization*

1877. REDMOND, J. ***Abies procera* as a timber tree for exposed sites.** *Scot. For.* 4 (4), 1950 (87–93). 3 refs.

Abies procera (*A. nobilis*) is compared with other conifers on exposed sites at high altitudes in the North of Ireland. In such conditions, Sitka Spruce is satisfactory where soil moisture is adequate, but not on dry sites; Larches are unsuitable, Scots Pine suffers defoliation each winter and fails; and each variety of *Pinus contorta* has its disadvantages. *A. procera*, however, does well on such sites, provided that drainage is good. It is tolerant of *Calluna*, and a dry mineral soil under grass-heath is typically suitable. Shortage of seed has caused this species to be planted in mixtures, but pure stands appear to be more satisfactory; spacing need not be closer than 6 × 6 ft. If mixtures must be employed, *P. contorta* var. *latifolia* is recommended as the most useful associate. *From author's summary.*

1878. BORGHINI, G. L. **I cipressi dell' Arizona. [The Arizona Cypresses.]** *Monti e Boschi* No. 7, 1950 (301–6). [It.f.e.]

The author accepts Wolf and Wagener's subdivision of *Cupressus arizonica* into 5 species—*C. montana*, *C. nevadensis* and *C. stephensoni* from California, and *C. arizonica* and *C. glabra*

from Arizona. The 3 Californian species have not been tried in Italy, but the other two, especially *C. glabra*, have been widely used for afforestation. *C. glabra* is inferior in form to *C. arizonica* and its moisture requirements are higher. It is therefore recommended that the latter should be used exclusively in future.

1879. KORT, A. Quelques notes sur les conifères de l'Arboretum de Kalmthout. **[Some notes on the conifers at the Kalmthout arboretum.]** *Bull. Soc. for. Belg.* 57 (11), 1950 (430–1). [F.]

Present age and girths in 1903 and 1950 respectively of a number of exotic conifers at this Belgian arboretum.

1880. NÉLIS, E., *et al.* Le mélèze du Japon. **[*Larix leptolepis*.]** *Bull. Soc. for. Belg.* 57 (8/9), 1950 (289–354). [F.]

Report of a special commission of the *Conseil supérieur de forêts*, set up to report on the silviculture of Japanese Larch, the results so far obtained with it in Belgium, and measures to be taken for improving present methods. A general account of the species, its silvicultural characters, diseases and insect pests, is followed by details of increment and yield from a number of plantations, and data from comparative tests on the wood of Belgian-grown European and Japanese Larch. [Cf. *For. Abstr.* 11 (No. 2359); 12 (No. 2493).]

1881. **Forests of exotic trees [in Southern Rhodesia].** *Rep. Div. For. S. Rhod. 1949*, 1950 (8).

For the first time, fairly extensive regeneration of *Eucalyptus maculata* occurred at Mtao Forest Reserve following a clear felling. Some 15% of the seedlings survived frost, drought, and choking by coppice growth. 13-year-old *Pinus caribaea*, *P. longifolia* and *P. canariensis* also coppiced at Mtao after thinning. At Stapleford Forest Reserve, *P. patula* regenerated wherever light was sufficient; regeneration of *Acacia mollissima* was usually very dense and may constitute a danger to Pine regeneration where mature Wattles adjoin Pine stands.

1882. HUCKENPAHLER, B. J. **Development of 19-year-old Southern Pine plantations in Tennessee.** *J. For.* 48 (10), 1950 (722–3).

An examination was made of one plantation each of *Pinus echinata*, *P. taeda*, *P. palustris* and *P. caribaea*, near Jackson, Tennessee, where the two last are considerably north of their native range. Planting had been done on abandoned cropland already showing slight gully erosion. The stand structure of the 19-year-old plots is described. All plots now have a complete ground cover of needle and leaf litter, native grasses, shrubs, and vines; and hardwood reproduction and further loss of soil are being effectively prevented.

1883. MÉTRO, A. Possibilités d'emploi des *Eucalyptus* dans les reboisements en France. Notes de voyage en Tasmanie et dans les Alpes australiennes. **[Possibilities of using Eucalypts for afforestation in France. Travel notes in Tasmania and the Australian Alps.]** *Ann. Éc. Eaux For. Nancy* 12 (1), 1950 (269–320). 41 refs. [F.]

An account of the climate, topography, vegetation etc. of Tasmania and the Kosciusko range (25 pages), followed by notes on the distribution, silvicultural characters, regeneration etc. of some 21 species of Eucalypts which might possibly be grown in France (20 pages). This list is complementary to the same author's account of species suitable for planting in North Africa. [Cf. *For. Abstr.* 12 (No. 238).]

1884. BURGERS, T. F. Geschiedenis van Forestal de Villarejo. **[The history of the Forestal de Villarejo.]** *Ned. Boschb.-Tijdschr.* 21 (8), 1949 (219–27). [Du.]

Account of the purchase and management by a Dutch company of a forest area in Spain. [Cf. *For. Abstr.* 11 (No. 2442).]

1885. LLENSA DE GELCÉN, S. Estudio botánico-forestal de los chopos (género *Populus*). Ensayo monográfico sobre los choperas de la cuenca inferior del río Tordera. **[A silvicultural and botanical study of *Populus*. Preliminary monograph on the Poplar stands of the lower basin of the river Tordera.]** *Anales de la Escuela de Peritos Agrícolas y Superior de Agricultura y de los Servicios Técnicos de Agricultura, Barcelona* 3 (1/4), 1943 (131–295). 53 refs. [Span.] [Escuela Superior de Agricultura, Barcelona.] L.S.

Is divided into 2 parts: (1) A botanical and systematic study of the European (including introduced) species, their distribution, ecology and silvicultural characters, with notes on pests and diseases, and, in some cases, the anatomy

of the wood. (2) A study of the Poplar stands of the lower Tordera basin, their history, and the species and varieties cultivated, with notes on customary planting methods in this region and on grading of the timber, costs and revenue. [Cf. *For. Abstr.* 12 (Nos. 1767–9), 1939–40.]

1886. ALLEGRI, E. Un pioppeto sperimentale in Toscana. [**An experimental Poplar plantation in Tuscany.**] *Monti e Boschi* No. 8, 1950 (345–55). [It.f.e.]

Describes the experimental plantings at Monsummano, made for the purpose of discovering Poplars suitable for planting in Tuscany. The best results have neen obtained with two strains of *P.* '*caroliniana*' (Bianco P and Grigio C, both from Casale Monferrato) and the hybrid 'A.M.' Other good results were given by *P.* '*regenerata eucalyptus*' and *P. monilifera.*

1887. KŇAZOVICKÝ, J. O topol'och. [**Poplars.**] *Pol'ana* 6 (2; 4), 1950 (32–6; 80–7). [Slovak.]

A discussion of the main varieties and hybrids as a basis of recommendations for Poplar propagation in Slovakia.

1888. SAATÇIOĞLU, F. Kavak (*Populus*) üretme ve yetiştirme tekniği. [**Technique of propagation and growing of Poplars.**] *Tarım Bakanlığ Orman Genel Müdürlüğü Yayınlarından, Istanbul* No. 70, 1948. pp. 58. 12 refs. [Turk.]

Includes an account of recent work in introducing 'Canadian' Poplar, as a species superior to the native Aspen and the widely distributed Lombardy Poplar [*Populus nigra* var. *italica*] which is knotty and unsuitable for the match and wood-working industries. After a preliminary failure in 1940–1 near the match factory at Büyükdere, owing to faulty technique, 7 ha. of transplants were established near the paper factory at Izmit (original spacing 2 × 2m. later thinned to 4 × 4m.) followed by another of 300 ha. in Gölcuk district; and by 1947 *ca.* 500,000 trees had been planted, apart from stock in numerous nurseries.

Lombardy Poplar has been commonly propagated (e.g. in Central Anatolia) from straight 1- to 4-m. shoots, stuck into holes 70–100 cm. deep made with a stake, and well firmed; spacing is generally close, at ½ m. Ordinary European practices, using shorter cuttings, are, however, being increasingly followed for both Lombardy and 'Canadian' Poplar.

1889. [**Acclimatization of *Santalum album* in Tanganyika.**] *Rep. For. Dep. Tanganyika 1948*, 1950 (12).

Sandalwood (*Santalum album*) has been successfully established at Morogoro and is spreading naturally along hedges in Dar-es-Salaam township. Conditions at Morogoro, including rock formation, are almost identical with those of parts of its natural range.

1890. **Primavera makes rapid early growth at Catalina.** *Carib. For.* 11 (2), 1950 (75, 99). [E.Span.] (*Rep. U.S. trop. For. Exp. Sta.*, 10 [1949?]).

A small plantation of *Tabebuia donnell-smithii* at an elevation of 500 ft. with a rainfall of *ca.* 100 in. p.a., has attained an average height of 10 ft. in 2 years, some of the trees being 3 in. in diameter. Another 2-year-old plantation near sea level, however, receiving about 60 in. of rainfall annually, averages only about 5 ft. in height.

1891. **Two coastal species grow well in mountains.** *Carib. For.* 11 (2), 1950 (76–7, 100–1). [E.Span.] (*Rep. U.S. trop. For. Exp. Sta.*, 10 [1949?]).

A comparison was made of two 13-year-old plantations of Maria (*Calophyllum antillanum*), both growing on exposed ridges. One, at an altitude of *ca.* 500 ft. (rainfall 80 in. p.a.) in the north-west limestone hills, on rocky, shallow and well drained soil, has an average diameter of 2·7 in., basal area being 38 sq. ft./acre. The other at an altitude of *ca.* 1,500 ft. (rainfall 100 in. p.a.), on deep, very degraded and only fairly well drained soil, has an average diam. of 3·6 in., b.a. being 50 sq. ft./acre. A similar comparison was made of 2 plantations of Maga (*Montezuma speciosissima*). An 11-year-old plantation in a limestone sinkhole at a height of 600 ft. (rainfall *ca.* 80 in. p.a.), on degraded soil, has an average diam. of 3·8 in. and b.a. 49 sq. ft./acre. A 13-year-old plantation at 2,500 ft. (rainfall *ca.* 110 in. p.a.) has an average diam. of 4·2 in. and basal area 37 sq. ft./acre. Current diameter growth of the former plantation is slow, and form of the latter far superior, with less epicormic branching.

1892. **Mahoe suffers wind damage.** *Carib. For.* 11 (2), 1950 (75–6, 99). [E.Span.] (*Rep. U.S. trop. For. Exp. Sta.*, 10 [1949?]).

In a plantation of *Hibiscus elatus* on limestone slopes with a rainfall of 60–80 in. p.a., the largest trees have reached a diameter of 3 in. and a height of 35 ft., 4½ years after planting. The trees, moreover, have not produced epicormic branches to the same extent as the related native species Maga (*Montezuma speciosissima*). There are indications that Mahoe may need a light protective overstorey until the bole is formed.

1893. **Bamboo grows slowly at high elevation.** *Carib. For.* 11 (2), 1950 (75, 99). [E.Span.] (*Rep. U.S. trop. For. Exp. Sta.* 10 [1949?].)

Bambusa spp., previously reported as a possible substitute for montane rain forest on adverse sites, has not continued its satisfactory development. A plantation of *B. longispiculata*, *B. tulda* and *B. tuldoides* on wet soil at an elevation of 2,500 ft. has taken 2 years to reach a size comparable to that of plantations at lower levels after 6 months. The tallest plants are about 15 ft. high; the largest stems only 1 in. in diameter.

21.1. *Light and Temperature Requirements*

See also *For. Abstr.* 12 (Nos. 1767, 1896, 1942).

1894. **Tolerant species outgrow intolerants in virgin rain forest.** *Carib. For.* 11 (2), 1950 (68–9, 91). [E.Span.] (*Rep. U.S. trop. For. Exp. Sta.* 10, [1949?].)

Includes some data on diameter growth in permanent plots. The natural discrimination against intolerant species in the climax forest is indicated by the comparatively slow growth of *Tabebuia pallida*, *Linociera domingensis* and *Didymopanax morototoni*, all of which were outstripped by *Manilkara nitida*, *Dacryodes excelsa* and *Sloanea berteriana*, whereas in the open the former grow more rapidly than the latter.

21.3. *Soil Requirements. Nutrient Requirements*

See also *For. Abstr.* 12 (No. 1946).

1895. Day, G. M., and Robbins, W. R. **Observations on the growth of Red Spruce in sand culture.** *J. For.* 48 (10), 1950 (689–92). 8 refs.

Picea rubens seed was sown in about 4 in. of sterile quartz sand in flat boxes kept in a greenhouse with a temperature of *ca.* 70–80° F. by day and 60° by night. The sand was kept moist by addition of distilled water. Seed had all germinated 6 weeks after sowing, and distilled water was replaced by a daily flushing with a dilute nutrient solution containing 70 p.p.m. of N, all as $Ca(NO_3)_2$. After 2 months of this treatment, the foliage appeared to be a little chlorotic, and for the next 3 months a solution was used containing 98 p.p.m. of N (⅔ as $Ca(NO_3)_2$) and ⅓ as $(NH_4)_2SO_4$. At the end of this period the seedlings were 4–6 in. high, or some 3 times as high as 1-year seedlings grown in the field and about equal to 2/1 transplants. It is pointed out that comparisons of this kind cannot be very accurate, since in natural conditions Red Spruce almost invariably displays a root system completely invested with ectotrophic mycorrhizae.

The colour of Red Spruce leaves, long used as a diagnostic feature, and variously described as yellow-green, deep green, or simply non-glaucous, is seen to depend on nutrition and to be an imperfect criterion for species identification.

1896. Mann, W. F. **Competition for light, water and nutrients.** *Sth. For. Note Sth. For. Exp. Sta.* No. 69, 1950 (3).

First-year height growth in experimental plots of Loblolly Pine seedlings indicates that competition for soil nutrients and water is much more severe than for light. A trench dug round the plants to free them from competition with hardwood roots, significantly increased Pine height growth, and watering the plots when soil moisture dropped below 12% was helpful. There was no increase in Pine height growth when the roots of the hardwoods were left undisturbed but their tops tied back to allow full sunlight to reach the Pines. Observations will continue for some years.

21.6. *Growth Form. Habit. Behaviour in the Stand*

See also *For. Abstr.* 12 (Nos. 1909, 1957, 2258, 2530).

1897. Wahlenberg, W. G. **Epicormic**

branching of young Yellow Poplar. *J. For.* 48 (9), 1950 (417–9).

It appears that in second-growth *Liriodendron tulipifera* the number of epicormic shoots is controlled by the same factors as influence the sprouting of old-growth trees [cf. *For. Abstr.* 10 (No. 156)]. Most abundant in dense stands, they are stimulated by heavy cuttings and often occur rather high on the clear stems. Many are on trees in subordinate tree classes, or on injured trees. Few are found on the most valuable parts of saw-log trees, i.e. the first two 16-ft. log lengths.

1898. Godnev, E. D. O vzaimootnosheniyakh topolya i buzinÿ v lesoposadkakh. [**On the mutual relations of Poplar and Elder in forest plantations.**] *Agrobiologiya* 1950 (2), (101–4). 2 refs. [Russ.] A.P.B.

Experience in the Buzuluk Forest since 1934 has shown that *Sambucus racemosus*, when planted in mixture with 'Balsam Poplar' [*Populus balsamifera*?], rapidly suppresses the latter. Cutting the Elder back to stump in the second or third year after planting was of little or no help to the Poplar, and after 11 years only a few scattered, poorly developed Poplars remained in a thicket of Elder. In mixture with other shrubs, of which *Euonymus verrucosus* is particularly instanced, the Poplar was not suppressed. Competition for water is apparently not responsible for these differences, since in 1938 measurement of soil moisture in the topmost metre showed that this was 2·9% higher under Poplar/*S. racemosus* than under pure Poplar, and the driest soil was that under Poplar/*Caragana*. A comparison is made of root systems in 11-year-old plantations of (*a*) Poplar/*E. verrucosus* and (*b*) Poplar/*S. racemosus*, and two characteristic examples are illustrated in diagrams. In (*a*) the Poplar had formed some long roots descending to 3 m. and more, and the *E. verrucosus* had a compact, shallow root system, generally only about ½ m. in radius, seldom encroaching seriously upon the rooting space of the Poplar. In (*b*) the Poplar roots mostly went no deeper than 1·5 m. and were developed chiefly in the top metre of the soil; the *S. racemosus* had a densely ramified root system occupying the same soil layers and frequently invading the rooting space of the Poplar.

21.8. *Phenology*

See also *For. Abstr.* 12 (Nos. 1767, 1913, 1920, 2046).

1899. **Phenology.** *Rep. For. Adm. Malaya* 1950 (7).

Draft rules for phenological transect plots in Malaya have been drawn up and circulated. Transects of milliacres are permanently demarcated in virgin jungle and regularly inspected for newly germinated seedlings of economic species which are ringed to distinguish them from old seedlings, and subsequent recruitment is distinctively marked in a similar manner. At the same time the fluctuations in total economic seedling population, due to mortality and fresh seeding, are studied by recurrent counts of all seedlings in each milliacre quadrat. Two such plots were laid out during the year; the main difficulty encountered was the identification of suppressed or moribund seedlings.

There was a good seed year in the Forest Research Institute Plantations. *Eucalyptus deglupta* was in flower and fruit during most months of the year and has been reported in flower at 3 months from planting. *Acacia auriculiformis* and *A. falcata* fruited twice and appear to flower soon after each crop of fruit matures. There was a general fruiting of *Dryobalanops aromatica* and *D. oblongifolia*, both of which take *ca.* 4 months from full flower to ripe fruit, from trees planted between 1926 and 1930 and having girths of 18–68 in.

1900. Jacquiot, C. Contribution à l'étude des facteurs déterminant le cycle d'activité du cambium chez quelques arbres forestiers. [**Some factors determining the cycle of cambial activity in some forest trees.**] *Rev. for. franç.* No. 11, 1950 (605–10). 15 refs. [F.] [Laboratoire de Biologie végétale de la Faculté des Sciences de Paris, Fontainebleau.]

Cambium taken at monthly intervals from November to March from adult trees of *Populus tremula*, *Castanea sativa* and *Ulmus campestris* was cultivated *in vitro* at a temperature of 25° C. and with natural daylight from a north window. The cambium of all 3 species proliferated freely at 25° without the application of growth substances. The addition of vitamins to the culture medium had only a slight effect on the activity and proliferation of cambium freshly taken from the trees, which

indicates that the tissues adjoining the cambium (sapwood and bast) have a sufficient reserve of these substances, even in winter, to assure almost optimum cambial activity for 6–8 weeks.

Observations were also made in the forest during the exceptionally mild winter of 1949, which indicate that the factor determining the cessation of functional activity in the leaves and then their fall, is the lowering of the temperature, and especially the lowering of nocturnal minima to the neighbourhood of 0° C. Even if reduced day-length can also produce these phenomena, the critical photoperiod is less than the length of day at the end of October in the latitudes of France.

22. SILVICULTURAL SYSTEMS. FORMS OF STAND

22.1. *High Forest Forms*

See also *For. Abstr.* 12 (Nos. 1910–2, 2516, 2531).

1901. VANSELOW, K. Der bayerische Femelschlag und seine Fortbildung. **[The Bavarian *Femelschlag* [group system] and its future development.]** *Forstw. Praxis, München* No. 6, 1949. pp. 56. 25 refs. [G.]

A defence of Gayer's *Femelschlag*, with chapters on:—(1) The history and definition of the system. (2) Its natural foundations, with special reference to the microclimate of forest stands in relation to natural regeneration. (3) Its aspects as regards general silviculture and logging. (4) Successes and failures in its application, with their causes. (5) Its future development. (6) Its sphere of application. (7) The technique of successive fellings under the system.

In general, the frequent lack of success with the system is attributed to a recession of interest in natural regeneration and attempts to force regeneration into as short a period as possible, particularly by the adoption of combinations with narrow strip (*Saumschlag*) systems which are incompatible with the *Femelschlag*. The author's opinion is that it is necessary to return to Gayer's original conception of the system as the foundation of future development.

1902. JOHNSON, R. S. **Silviculture as applied through cutting methods by Mersey Paper Company Ltd.** *Pulp Paper Mag. Can.* 51 (8), 1950 (103, 106, 108, 110–2). 8 refs. 2 gphs. 2 tbls. *Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1074 (*F*–2).

Describes some of the Company's pulpwood stands and the application to them of selection felling methods.

1903. ZILLGITT, W. M. **Does the partial cutting of northern hardwoods result in inferior reproduction?** *Tech. Notes Lake St. For. Exp. Sta.* No. 340, 1950. pp. 1.

The quality of reproduction after selective logging of northern hardwoods compares favourably with that produced by clear felling.

1904. LONGWOOD, F. R. **Log grade recovery on a selection cutting in northern hardwoods of Upper Michigan.** *Tech. Notes Lake St. For. Exp. Sta.* No. 335, 1950. p. [1].

22.2. *Coppice Forest*

1905. JOHNSON, J. W. **Cottonwoods respond to selection cuts.** *Sth. For. Note Sth. For. Exp. Sta.* No. 66, 1950 (2).

After a heavy felling, leaving only the trees that appeared most likely to respond to release, growth rate of Cottonwood [? *Populus deltoides*] trees of good vigour in a mature stand increased by 50% in the second year, and that of trees of poor vigour by 15%. This suggests that a series of selection cuts, rather than clear cutting or cutting to a diameter limit, may be the best method of harvesting mature stands.

1906. BELLUCCI, V. La produzione forestale delle colline livornesi. **[Forest production on the hills near Leghorn.]** *Ital. for. mont.* 5 (6), 1950 (204–10). [It.f.]

Analyses the production of the woodlands of an estate near Leghorn, worked as coppice on a 12-year rotation, with particular attention to the assortments produced, expenditure of manpower and financial return. The advantage of proximity to a densely populated and intensively cultivated agricultural area are stressed. The principal species grown are *Quercus ilex*, *Q. cerris*, *Arbutus unedo*, and *Fraxinus ornus*.

1907. PRINGLE, A. N. **The Enugu pitwood plantations, Nigeria.** *Emp. For. Rev.* 29 (3), 1950 (238–43).

The development of coal-mining in Enugu about 1912 led to the formation of a plantation to supplement the supplies of Mangrove pitprops brought by rail from Port Harcourt.

The props were required in lengths of 4–12 ft., with a minimum top diameter of 1 in. per running ft. Despite a rainfall of 72 in. p.a., silviculture was not easy on the heavily farmed and degraded lateritic soil of the area. Of many species tried, *Tectona grandis* and *Gmelina arborea* have proved the most satisfactory. Both are now grown on a coppice and clear-felling system with a 15-year rotation; this produces at least one 12-ft. pitprop per tree. They are equally acceptable as mining timbers and have similar silvicultural demands. *Gmelina* is less exacting than Teak, but has a pronounced tendency to taper. New plantations are established by *taungya* farming. *From author's summary.*

23. FORMATION OF STANDS

1908. GORDON, W. A. **Regeneration at high altitudes in Cyprus.** *Emp. For. Rev.* 29 (3), 1950 (235–7 + 8 photos).

The most important forest trees in Cyprus are *Pinus nigra* var. *caramanica* at high levels and *P. halepensis* var. *brutia* at lower levels. The Pine forests have been badly misused in the past, but during the last 10 years they have been given almost complete relief from goat grazing The response of *P. halepensis* has been remarkable, and both natural and artificial regeneration have been easily obtained. Natural regeneration of *P. nigra*, however, seems to depend on more than one major factor, notably the dates on which the winter snows fall and melt. In 1950 late snow (which protected the fallen seed from birds) and an early spring thaw, followed by good May–June rains, produced abundant regeneration for the first time. At high altitudes, where *P. nigra* forest has been so burnt out that insufficient seed-bearers remain, regeneration must be effected by artificial means, and the soil must first be stabilized by the introduction of fast-growing herbaceous plants. Various species were tried, and good results obtained by sowing such steep eroded slopes with a native species of *Alyssum.*

23.1. *Natural Regeneration*

See also *For. Abstr.* 12 (Nos. 1804, 1808, 1824, 1881, 1899, 1901, 1903, 1923, 2088, 2460, 2519).

1909. GULISASHVILI, V. Z. Osobennosti vozniknoveniya i razvitiya lesnŷkh soobshchestv. [**Peculiarities in the arisal and development of forest communities.**] *Agrobiologiya* 1950 (2), (83–9). 1 ref. [Russ.] [Gruzinski Sel'skokhozyaystvennŷ Institut im. L.P. Beriya, Tbilisi.] A.P.B.

Discusses the usual ways in which the species is maintained by natural regeneration in the face of potential suppression by competitors, and especially by herbaceous vegetation: (1) In the forest zone, abundant seeding and rapid colonization of open areas (burnt areas, felling sites, abandoned fields) by a dense, more or less uniformly distributed and even-aged seedling stand which resists any material invasion by weeds. If rapid and dense colonization does not occur, weed growth develops first and man's intervention is usually necessary to restore forest conditions. More open, uneven-aged mixed forest on steep slopes with shallow, stony soils, may show a continuous reproduction of scattered individual seedlings, but here dense regeneration is not necessary since there is no danger from weed growth, any more than there is in virgin or selection forests where regeneration takes place in groups ('nests') in gaps. (2) In the open woodland of the timberline and the zone between forest and steppe, where competition from herbaceous vegetation is intense, the isolated groups ('nests') of trees maintain themselves by gradual reproduction from seed, and often also vegetatively, as more or less uneven-aged stands. Some examples are given of the composition of *Pistacia* 'nests' in the Georgian forest-steppe region, consisting of trees and young growth of *Pistacia* together with its shrubby associates, e.g. *Rhamnus* sp., *Paliurus spina-Christi*, *Berberis* sp., and *Jasminum* (*fruticans*?).

Concludes by drawing a distinction between competition, which according to 'Michurin biology' does not occur between members of the same species, and the process of self-thinning, which is regarded as a process serving the species itself by maintaining the stand at a density appropriate to the site and the age of the individuals composing the stand, i.e. as a gradual shedding of the individuals that are unnecessary for the preservation and development of the species in competition with others.

1910. BONNER, E. **Regeneration of Spruce and Jackpine after cutting.** *Pulp Paper Mag. Can.* 51 (7), 1950 (134, 136).

Woodl. Sect. Index Canad. Pulp Pap. Ass. No. 1086 (*F*–2).

Results of an enquiry indicate that Spruce regeneration varies throughout Eastern Canada. In the maritime regions natural regeneration is fairly satisfactory, but inland an adequate second crop is difficult to obtain except on wet lowland sites. Indications are that the moisture condition during the period of germination and establishment, rather than the supply of seed, is the critical factor. In general, partial cutting gives no better condition for regeneration than clear cutting. Regeneration of Jack Pine, important chiefly in Ontario and the west, is generally poor; suggestions for improvement include some disturbance of the soil by mechanical means or by burning.

1911. Mowat, E. L. **Cutting Lodgepole Pine releases Ponderosa Pine reproduction.** *J. For.* 48 (10), 1950 (679–80).

This study, made in Pringle Falls Experimental Forest, Central Oregon, demonstrated that:—(1) Ponderosa Pine reproduction, severely suppressed for 40 years or more by an overstorey of Lodgepole Pine, will recover and grow well on certain sites after clear cutting of the Lodgepole Pine; (2) substantial loss in number of seedlings sometimes occurs as a result of clear cutting. Experiments are to be made to test the possibility of reducing this mortality by effecting partial cuts over a much larger area at a time, or by a shelterwood cut followed by a later clear cutting of Lodgepole Pine, in order to reduce the check to seedling growth due to the shock of sudden opening.

1912. **Management of Beech forests holds high promise.** *Rep. N.Z. For Serv. 1949–50*, 1950 (5).

An indigenous Beech (*Nothofagus*) forest in the Nelson-Marlborough Conservancy is being managed under guidance of the national forest survey. Before logging, seed trees are reserved, and the mineral soil of the forest floor exposed by removal of the *Blechnum* fern. After logging, the rest of the trees are felled, and additional usable material salvaged. Ample regeneration occurs within a short time, and thrives on the exposed forest floor. Owing to the heavy deer population in this locality, the whole managed area is being deer-fenced. An example of the deer damage to be prevented, occurs in one 30-year-old clearing in this forest, in which the Beech regeneration instead of now averaging 35 ft. high and 5 in. d.b.h., consists of plants 6 in. high with stems no more than 0·5 in. in diameter, owing to continual deer browsing.

1913. **[Regeneration of Beech.]** *Rep. Dep. sci. industr. Res. N.Z.* 1950 1(7).

Regeneration following the 1949 seeding has been examined in several parts of New Zealand and records obtained from a number of observers. It appears that regeneration does not necessarily follow heavy flowering, as the weather at this time may affect the subsequent development of seed. In one forest the 1950 seedfalls proved to be *ca.* 1% of the 1949 fall, in numbers of seed.

1914. Louvel, M. Notes sur les forêts malgaches de l'est. **[Notes on the eastern Madagascar forests.]** *Rev. int. Bot. appl. Agric. trop.* 30 (333/334), 1950 (370–8). [F.] P.R.

The very numerous (up to 250) tree species are represented by all age classes, giant trees being rather rare. The forests are regenerated naturally, although this regeneration is very slow. After a fire, the site is never reforested naturally with the same species as before the fire. The new (secondary) forest is composed of *Albizzia*, *Solanum*, *Harungana*, *Dombeya* and *Weinmannia* species. It is only later that the seeds of taller species can be sown. A secondary forest, when destroyed by fire, forms dense brushwood (savoka) which protects the soil against erosion and desiccation. Eucalyptus, introduced in 1910–12, is rapidly spreading in Madagascar. The rest of the paper deals with the work done by the author during the period 1909–39 in the Analamazaotra (Périnet) forest, aiming at a rational method of forest management in East Madagascar forests.

23.2. *Artificial Regeneration*

See also *For. Abstr.* 12 (Nos. 1908, 2257).

1915. Villegas de la Vega, R. Repoblaciones con especies forestales de crecimiento rápido en la zona baja de la provincia de Santander. **[Reforestation with quick-growing species in the lower regions of Santander province.]** *Montes, Madrid* 6 (34), 1950 (477–84). [Span.]

A brief account of reforestation with *Pinus radiata* and Eucalypts in the forest of Corona, an area typical of the forests of this region.

1916. SAATÇIOĞLU, F. Sun'î orman gençleşdirmesi ve ağaçlandırma tekgniği. [**Artificial forest regeneration and afforestation technique.**] Hüsnütabiat Basimevi, Istanbul. 1946. pp. 337. [Turk.]

General principles and practice, with special reference to Turkish conditions and practice. Illustrated.

1917. POURTET, J. La mécanisation des repeuplements artificiels. [**The mechanization of artificial regeneration.**] *Rev. for franç.* No. 10, 1950 (564–9). [F.]

Describes experiments with the American 'Reforestator' [cf. *For. Abstr.* 9 (No. 2181)], and briefly describes a device for digging planting holes, to be attached to a 4-h.p. mechanical cultivator, and manufactured by the firm of Bungartz at Munich. [Cf. *For. Abstr.* 12 (Nos. 2376–7).]

23.21. Choice of Species

See *For. Abstr.* 12 (Nos. 1873, 1877–8, 1885–8, 1907, 1957–8, 1979, 1983–4, 1990–1, 2527)

23.22. Preparatory Work. Auxiliary Measures

See also *For. Abstr.* 12 (No. 1907, 1934–5, 1940, 1987–9).

1918 TROMP, P. H. M. Een oppervlakkige grondbewerking met de schijvenstoppelploeg. [**Shallow cultivation with the disk stubble plough.**] *Tijdschrift der nederlandsche Heidemaatschappij, Arnhem* 60 (1), 1949 (7–11). H.S.B.

The model used by the Heidemaatschappij has 9 disks (other models have 6 or 13) on a single axis, a working breadth of 1·65–1·80 m., a working depth of 10–20 cm. and a weight of 1,200 kg. Seven ha. of heathland can be ploughed to a depth of 10 cm. in two 8-hr. working days, and 30·5 km. of forest roads with an average width of 5·4 m. can be cultivated in 6 working days of 11 hr.

1919. GEERLING, L. C. Een paar eenvoudige boswerktuigen. [**Some simple forestry implements.**] *Ned. Boschb.-Tijdschr.* 21 (5), 1949 (127–34). [Du.]

The uses of the Gepas ridge plough and a subsoiler, both already described [see *For. Abstr.* 9 (No. 1536)], are discussed. The implements have been used successfully, drawn by horse or tractor, to prepare for planting heathy ground and areas where young woods have been burnt. Estimated costs per ha. for different types of terrain are given. The subsoiler will cultivate the soil to depths of 40–45 cm. The narrowness of the plough allows its use between rows in 40- to 45-year-old Pine stands, to mix the litter into the soil, to clear mossy ground or to make furrows for underplanting or sowing. Improved models of the plough, including one for use on more difficult ground with tall growth of heath and bilberry, are described with illustrations.

23.23. Seed and Sowings

23.23.1. *Seed Production, Procurement, Treatment, and Testing*

See also *For. Abstr.* 12 (Nos. 1789, 1899, 1913, 2204).

1920. PANOV, A. Načelna razmatranja o fruktifikaciji šumskog drveća. [**Physiological maturity and periodicity of seed years in forest tree species.**] *Šum. List* 73 (10/11; 12), 1949 (334–45; 407–13). [Croat.russ.e.]

The author discusses the principal factors involved, on the basis of his own observations in the forests of Bosnian Krajina, and stresses the need for phenological study, particularly of isolated and predominant individuals, although to confine seed collection to these categories would unduly restrict the seed resources. According to his own experience, the fertility of Oak, Juniper and Silver Fir does not decline with age.

1921. MORANDINI, R. La produzione di seme delle piante forestali. [**Seed production by forest trees.**] *Monti e Boschi* No. 4, 1950 (169–73). 5 refs. [It.]

Data on production of (1) hl. cones/ha., and (2) kg. seed/ha., for *Pinus pinea, P. pinaster, P. sylvestris, P. strobus, Picea abies, Larix decidua,* and *Pseudotsuga taxifolia,* collated from various authors.

1922. [**Seed dispersal of British Columbia coastal conifers.**] *Rep. B.C. For. Serv. 1949,* 1950 (26–8).

A study was made at the Cowichan Lake Station of the dissemination from a moderately good cone crop in 1948. Dispersal started early in September for *Abies grandis*, *A. balsamea*, and *Thuja plicata*, and late in September for *Tsuga heterophylla*, and was well maintained to the end of December. Seed of *A. balsamea* had all fallen by December, by which time 97% of *T. plicata*, 75% of *A. grandis* and 43% of *Tsuga heterophylla* had been dispersed. The rate of fall of *T. heterophylla* increased in March, and in April was the same as in December.

1923. Fowells, H. A. **Some observations on the seedfall of Sugar Pine.** *For. Res. Notes Calif. For. Range Exp. Sta.* No. 70, 1950. pp. 3.

Report on data from the Stanislaus Experiment Forest on the dispersal of *Pinus lambertiana* seed and on the amount necessary to secure adequate reproduction. Sound seed (91% of the total) fell on the 3·2 acres surrounding each tree, at the average rate of 8,250/acre, 65% of it falling within a radius of 1·59 chains and the remainder being fairly equally distributed in the outer zone to a distance of 3·19 chains Distribution was fairly uniform all round the trees in spite of strong E.–N.E. winds on one day of the counting period. In several reproduction counts it was found that the number of Sugar Pine seedlings amounted to only 0·4–2·5% of the seed dispersed, and at this rate it would be only within a 100-ft. radius from the tree that natural regeneration would be adequate even in a good seed year.

1924. Barnard, R. C. **Fruit collection and germination of certain Dipterocarpaceae.** *Malay. Forester* 13 (3), 1950 (164–5). [Forest Research Institute, Kepong.]

When collecting fruit of Dipterocarps for planting, it has been the custom to select fruit of which the wings are brown and crisp and the nut brown with the radicle just showing at the apex. Germination tests on *Dryobalanops aromatica* showed that much better results were obtained from fruit with seedcoat and cup green, basal third of wings yellow, and apical two-thirds of wings brown and moderately crisp—all signs of freshly fallen seed.

1925. Barnard, R. C. **Seed storage trials in sawdust.** *Malay. Forester* 13 (3), 1950 (163–4). [Forest Research Institute, Kepong.]

Experiments were made in the storage of newly fallen fruit of *Shorea leprosula*, *S. parvifolia*, *S. acuminata*, *S. resinanigra* and *Anisoptera laevis* in fresh sawdust [sp. not stated]. In all these species, emergence of the radicle normally occurs within 5–8 days of the fruit's falling and no means has yet been discovered of delaying this process while retaining viability. Storage in sawdust did not delay development of the radicle, but kept it alive for 7–14 days, after which deterioration was rapid; all fruits were dead after 28 days' storage. *Koompassia malaccensis* fruit was similarly stored and tested, and gave 24% germination after 35 days' storage, but only a very small % after 40 days.

1926. Lindsay, R. C., and Baisinger, D. H. **Tree seed extraction on the Columbia tree farm of Crown Zellerbach Corporation.** *For. Cl. Quart.* 23 (3), 1950 (13–8).

Methods of drying cones, extracting, dewinging, cleaning and storing seed of the principal West Coast conifers, with some indication of costs.

1927. **Cleaning and storing [Slash] Pine seed.** *Rep. Sth. For. Exp. Sta. 1948* [?1949] (2–3).

Quick flotation in water, followed by exposure to the sun in shallow layers on 3 days (storage in air-tight tins between sunnings), was found to be a satisfactory way of cleaning *Pinus caribaea* seed, which could then be stored either at 38° F. or at room temperature. Standard stratification treatment is 30 days, but small-scale tests have indicated that good results can be obtained from as few as 8 days of stratification.

1928. **Seeds of various species studied.** *Carib. For.* 11 (2), 1950 (73–4, 97). [E.Span.] (*Rep. U.S. trop. For. Exp. Sta.* 10 [1949?]).

Seeds of *Byrsonima spicata* were 75% viable after 2 years' storage at room temperature. After 4 years' storage 10% of seeds of *B. cuneata* germinated, whereas fresh seeds did not germinate at all. Germination of fresh, apparently sound, seeds of *Acrodiclidium salicifolium* and *Zanthoxylum flavum* was less than 5%.

1929. GINDEL, Y. **[Seed storage.]** *Forest, Palestine* No. 2, 1950 (24–6, Suppl. 5–6). [Heb.e.]

Describes tests on 13 indigenous woody species, stored 1–2 years under conditions simulating those in which their seeds ripen naturally, and then treated in various ways (mostly water soaking and removal of pericarp) before germination. Results are tabulated. *Pistacia atlantica* soaked for 6 hours in acid plus 17 hours in water, after storing for one year, gave a far higher germination % if the pericarp was not removed during storage. *Phillyrea media*, without pre-treatment by soaking, showed similar results, whereas *Laurus nobilis* showed a contrary tendency.

1930. ALLEN, H. T. **Germination requirements of seeds of trees and shrubs.** *Report of Proceedings of the Western Canadian Society of Horticulture, Fourth Annual Meeting, Saskatoon* 1948 (26–9). 19 refs. E.M.B.

A brief general account of methods of breaking dormancy, with notes on stores and viability.

1931. NIKOLAEVA, M. G. O prorastanii zarodýshey semyan bereskleta evropeyskogo. **[Germination of [excised] embryos of *Euonymus europaeus* seeds.]** *Dokl. Akad. Nauk S.S.S.R.* 71 (1), 1950 (175–8). 5 refs. [Russ.] I.I.E.

Laboratory experiments on the germination of embryos excised from freshly gathered seed and seed stored dry or moist for varying periods, showed that some drying of the seed appears necessary for rapid and satisfactory germination. It is therefore recommended that seed of this species should be allowed to dry out for several days before being stratified.

1932. DABRAL, S. N. **After ripening in *Juniperus macropoda*.** *Indian For.* 74 (12), 1948 (1950) (402–5). 4 refs.

Seed of *J. macropoda* does not ordinarily give more than 1% germination, and various soaking and boiling treatments failed to increase this. Seed from 2-year-old berries collected in December, soaked in cold water for 24 hours, and then placed in a glass bottle and buried 2 ft. deep in garden soil for 2–3 months, gave up to 20% germination. It was noticed that the germination period of the treated seeds ended *ca.* 30 days after sowing, after which a secondary dormancy sets in.

1933. BULARD, C. Action de l'hétéro-auxine sur la croissance de *Thuja orientalis*. **[The effect of hetero-auxin on the growth of *Thuja orientalis*.]** *Trav. Lab. for. Toulouse* 1 (4), Art. 32, 1949. pp. 2. [F.]

The soaking of *T. orientalis* seeds for 24 hours in a solution (10 mg./l.) of indole-β-acetic acid, had little effect on root growth (which is known to be accelerated by lower concentrations) but produced a marked acceleration in the development of the hypocotyl. It appears that the hetero-auxin at this concentration acts not only on the elongation of the cells but also on the proliferation of the meristem.

23.23.3. *Methods of Sowing*

See also *For. Abstr.* 12 (Nos. 1987–9, 2371–3).

1934. FISHER, J. N. **Direct seeding of forest species.** *Wisconsin Conservation Bulletin, Madison* 15 (3), 1950 (24–5). B.A.P.

Describes a machine for direct sowing of forest seed developed by the Nekoosa-Edwards Paper Co. The machine is made from a small rotary tiller with 2 corn-planting hoppers attached in such a way that a regulated volume of seed can be introduced into the soil loosened by the blades of the tiller. The seed, being covered by a thin layer of soil, has some protection from birds and rodents.

1935. **[Direct sowing of Slash and Longleaf Pine in Louisiana.]** *Rep. Sth. For. Exp. Sta. 1948* [?1949] (4–5).

Pinus caribaea and *P. palustris* seed were sown on plots treated as follows: (1) disked, (2) ploughed furrows, (3) freshly burned, (4) hoed spots, and (5) undisturbed heavy rough. The whole area was patrolled against birds for 45 days. Satisfactory results were obtained on plots (1) and (2). Initial establishment was good on (3), but summer mortality was heavy. (4) and (5) were failures. Other experiments on unpatrolled areas completely failed, and the use of repellents, mulching etc. did not keep the birds off.

1936. RUDOLF, P. O. **A test of pelleted Jack Pine seed.** *J. For.* 48 (10), 1950 (703–4). 3 refs.

A study was planned to show how pelleted Jack Pine seed compares with bare seed, and how surface sowing compares with conventional sowing. Two kinds of commercial pellet were

used. In type A the pelleting material was reported to be 65% feldspar and 35% fly ash; the pellets were somewhat irregular, being roughly the shape of the seed; the average weight of 1,000 of these pellets was 32 g., compared with 3·7 for 1,000 bare seed. In type B the pelleting material was reported to be montmorillonite, a highly colloidal aluminium silicate; the pellets were spherical and very uniform in size; the average weight of 1,000 pellets was 92 g. The following facts were established:—(1) Bare, untreated seed, sown at a depth of 0·25 in. generally germinated as well as any of the pelleted treatments and better than some. (2) Type B pellets sown at a depth of 0·25 in. generally germinated as well as the untreated seed; the type A pellets generally did less well. (3) Surface-sown pellets produced many fewer seedlings than those sown at a depth of 0·25 in. Many seedlings from surface-sown pellets died before they could get their radicles into the soil. Type B pellets, although harder, disintegrated much faster than type A when they were moistened. (4) The type B pellets generally gave better results than type A. It is considered that the main advantage of using pelleted seed in afforestation would be the possibility of establishing seed spots without the development of multiple seedlings. A tool for planting one seed at a time has been devised in the Pacific Northwest. [Cf. *For. Abstr.* 7 (No. 207); 8 (No. 1847).]

1937. Schroeder, G. H. **Seeding of forest land from the air.** *J. For.* 48 (10), 1950 (712–5). 8 refs.

A review of the experiments so far made in direct aerial sowing of Douglas Fir for afforesting logged and burned-over areas in the Pacific North-West.

1938. Aikman, J. M., and Cooper, G. R. **Direct seeding of Black Locust for production of posts in southern Iowa.** *Proc. Iowa Acad. Sci.* 56, 1949 (95–9). 10 refs. A.P.B.

Describes an experiment made to compare results of direct sowing and planting of *Robinia pseudoacacia* on eroded Lindley silt loam prepared by the narrow bench-terrace method. Differences in growth between transplants and directly sown stock, of identical but not local provenance, was slight, the transplants having a slight advantage in the first year. Stock from directly sown seed of selected local trees maintained a somewhat higher growth rate than either.

23.24. Formation of Stands by Planting

See also *For. Abstr.* 12 (Nos. 1917, 1938, 2376–7).

1939. Piccarolo, G. Il piantamento del pioppo. [**Poplar planting.**] *Ital. for. mont.* 5 (6), 1950 (214–9). [It.f.e.]

1940. **Cottonwood planting.** *Rep. Sth. For. Exp. Sta. 1948*, [?1949] (7–9).

The best method so far devised for controlling vegetation that competes with Cottonwood [?*Populus deltoides*] cuttings during the first growing season, is the use of a 4-disk plough for site preparation, application of fertilizer to individual trees in the spring, and hoeing in the early summer. Many chemicals and various intensities of application were tested in the hope of controlling annual weeds at a low cost, but none was wholly satisfactory. Refrigerated cuttings retained their viability and established themselves in swamp sites when planted in late May, and with favourable weather even July plantings survived. The principal difficulty is the shortness of the growing season left for the cuttings to attain height enough to ensure second-season success against weed competition. Tests indicated that plantation spacings of 6 × 6 and 4 × 10 ft. are too close for Cottonwood. It appears that 10 × 10 ft. is the minimum desirable.

1941. **The effect of longitudinal splitting of Teak stumps.** *For. Res. India Burma 1946–47*, 1950 (53).

Experiments conducted during the year lent further support to the use of halved Teak stumps. Plants raised from them did not differ significantly in height growth from plants raised from whole stumps. Quartered stumps, however, produced a significant loss of height growth. It is not known whether these initial differences disappear with increasing age.

23.26. Plant Rearing. Nursery Practice

See also *For. Abstr.* 12 (Nos. 1753–8, 2339–40, 2362, 2402–3).

1942. Leman, V. M. Ob uskorenii razvitiya seyantsev nekotorŷkh khvoynŷkh

porod pri neprerÿvnom osveshchenii. **[Hastening the development of seedlings of some conifers by continuous illumination.]** *Dokl. Akad. Nauk S.S.S.R.* 71 (1), 1950 (163–6). 6 refs. [Russ.] [Moskovskaya Sel'skokhozyaystvennaya Akademiya im. K.A. Timiryazeva.] I.I.E.

[Cf. *For. Abstr.* 12 (No. 288).] The present paper reports briefly, with photographs and tables, on trials during 1949 in which seedlings of *Pinus sylvestris* and *P. sibirica* grown in the open on plots of 1·5 sq. m. (35–40 plants per plot), were given artificial light at night [starting date not specified]. Ordinary electric lamps were used, each plot being illuminated by a single lamp. There were two variants: (1) 100-watt lamp suspended at a height giving 500–800 luxes at the centre of the plot and 100–200 at its edges; and (2) 500-watt lamp giving 1,000–1,500 luxes at the centre and 500–700 at the edges. In spite of cold, rainy weather from June to mid-August the treated seedlings much surpassed controls. At 4 months old results were as follows [figures for (1) and (2) are given in that order]:—*P. sylvestris*:—height 8 and 12 cm. (33 and 100% greater than controls): primordial (solitary) leaves 3 and 3·5 cm. long (50 and 75% longer than controls); adult, paired needles—normally not acquired until the second and third year—appeared after 1 month of supplementary light. *P. sibirica*: height 9 and 10 cm. (80 and 100% greater than controls); cotyledons 2·5 and 3·5 cm. long (67 and 133% longer than controls); this species, which in its first year normally produces only cotyledons and sometimes primordial leaves, developed the adult 5-needled bundles with needles 6·5 and 9·5 cm. long when given artificial light. The figures obtained point to a direct correlation, for the range studied, between these effects and the intensity of the artificial light.

1943. McQuilkin, W. E. **Preservative treatments for cloth nursery-bed covers.** *J. For.* 48 (8), 1950 (351–3).

A study was made of 10 treatments for increasing the service life of burlap used as a cover to seedbeds. Tests were made in Maryland, Nebraska and Michigan and results varied a good deal from place to place. No one treatment stood out as distinctly superior, but Cu naphthenate/asphalt/bentonite gave the most consistently good results. Two organic dyes—fustic and quercitron—did almost as well as, and are much cheaper than the naphthenate, though their application would cost more. Anderson and Kinneer's estimate that the service life of burlap can be increased 400% [cf. *For. Abstr.* 11 (No. 1014)] is regarded as over-optimistic. From present evidence, the author considers that treatment would not do more, on the average, than double the service life of cloth.

1944. Barnard, R. C. **Coir dust mulch in nursery practice.** *Malay. Forester* 13 (3), 1950 (165). [Forest Research Institute, Kepong.]

Trials of coir dust (the waste product from coconut husks after separation of the fibre) as a mulch for nursery beds, indicate that it both benefits seedlings and saves labour. In an experiment with *Swietenia macrophylla*, 11 beds were sown, of which 5 random beds were mulched. At 2 months from sowing, the mulched beds had been watered only 3 times and showed a seedling % 9·4 better than unmulched beds that had required daily watering. A similar saving in watering has been obtained by mulching transplants and seedlings as soon as they are a few inches high. No sign of termite attraction or loss of fertility has been observed, such as occurred with sawdust mulch. Sifted coir dust is also an excellent medium for germination tests and for mixture with soil for raising seedlings in boxes or pans, reducing the need for watering and decreasing the danger of damping off.

1945. Harmon, R. **Sawdust for seedbeds.** *Amer. Nurserym.* 92 (4), 1950 (44–5).

Further evidence of the value of sawdust as a mulch in growing Rhododendrons. [Cf. *For. Abstr.* 12 (No. 291).]

1946. Westveld, R. H. **Responses of Slash Pine (*Pinus caribaea* Morelet) to various nutrients in Norfolk soils in Florida.** Dissertation, Michigan State College. 1946. pp. 225. *Biol. Abstr.* 23 (9), 1949 (27414). Microfilm copy of text available from University Microfilms, Ann Arbor, Mich. Price $3.19.

The response of *Pinus caribaea* seedlings to various nutrients during the first season's growth was studied in Norfolk sands in both greenhouse and nursery. 55 soil treatments involving 2,120 trees, were studied in the

greenhouse experiments during 3 seasons; 19 treatments involving more than 25,000 trees, from which 1,020 trees were sampled, were used in the nursery experiments during 2 seasons. Application of N or N and K plus 20–25 tons per acre of colloidal phosphate produced marked response, as did also 10 tons of peat plus nutrients. Combinations of 2 or more of 4 nutrients studied, resulted in more favourable response than a single nutrient. Large initial applications of nutrients depressed the growth of the seedlings, application of N alone in a single large quantity being very harmful. Type of soil treatment had no significant effect on root/shoot ratio. Results in greenhouse and nursery showed similar trends.

1947. Stoeckeler, J. H. **Can nurserymen produce White Pine seedling stock comparable to transplants?** *Tech. Note Lake St. For. Exp. Sta.* No. 339, 1950. pp. 1.

The results of an experiment at Hayward Nursery, Wis., indicate that 3/0 seedlings of *Pinus strobus* grown at a nursery density of 25/sq. ft. provide planting stock comparable to 2/1 transplants, at a lower cost.

1948. Anić, M. O izbojnoj snazi prikraćenih jasenovih biljaka. **[Coppicing ability of cut-back Ash plants.]** *Glasn. šumske Pokuse* 9, 1948 (19–41). 16 refs. [Croat.e.]

Describes experiments made at the Forest Nursery of the Faculty of Agriculture and Forestry of Zagreb University on seedlings and transplants of 3 *Fraxinus* species cut back to different heights. Buds on *F. americana*, *F. oxycarpa* and *F. excelsior* are not found at ground level, and are abundant only at a height of 4 cm. and over. The higher the stump, the greater the % of plants that re-shoot, the more numerous the side shoots, and the greater also the % of plants with a partially top-dry stump and the greater the extent of such stump-dryness. It is best therefore to cut back to a height of between 4 and 5 cm. The stumps regenerate mainly from dormant buds, shoots appearing in pairs. Cut-back plants that do not re-shoot remain alive for 1–4 years. If the cut surface is occluded, the plants live for 3–4 years. Coppicing takes place immediately or not at all. Better results were obtained with seedling plants, since transplants are apt to be set too deep or too shallow; planting too deep is the less injurious.

1949. Fey, W. Die Baumrodemaschine (System Fey). **[The Fey tree-lifting machine.]** *Deutsche Baumschule, Aachen* 1 (2), 1949 (19–20). [G.] E.M.B.

This machine, for lifting trees in the nursery, cuts through the soil on 3 sides of the tree by means of a blade set at 25–30°. A 3-pronged extension further loosens the soil round the tree, and thus facilitates its removal by hand. The soil is penetrated to a depth of 50 cm. or more. When used on rows of trees extending for about 200 m., 2,000–2,500 trees/hr. have been lifted with roots completely intact.

23.27. Arboriculture

See also *For. Abstr.* 12 (Nos. 1744, 2292–5).

1950. Peipson, H. B., and Nash, R. W. **The planting and care of shade trees.** *Bull. Me. For. Serv.* No. 14 (rev.), 1950. pp. 32. 32 refs.

Revised edition of a bulletin first published in 1941.

23.3. *Afforestation*

See also *For. Abstr.* 12 (Nos. 1673, 1739, 1804, 1882, 2554).

1951. Beaver, S. H. **Rehabilitation of derelict land [in Great Britain].** *Nature, Lond.* 166 (4224), 1950 (630–2). 8 refs.

Résumé of a symposium held on 5 Sept. in the Botany and Agriculture sections of the British Association at Birmingham.

1952. Keresztesi, V. Országfásítás és legelögazdálkodás. **[Reforestation of the country and the economics of grazing.]** *Erdész. Lap.* 85 (12), 1949 (275–80). 16 refs. [Hu.russ.f.]

Overgrazing of pasture and of land cleared of forest has resulted in extensive denudation in Hungary. In addition to reforestation, new forests must be created of more than 1½ million acres. Grazing needs should be met partly by farming rich pasture land between the planned shelterbelts and partly by intensive fodder production; grazing in the forest should be totally eliminated.

1953. Le reboisement par les particuliers. **[Afforestation by private landowners.]** Association nationale du Bois, Paris. 1939–47. pp. 24 + 72 + 33 + 96 + 62 + 84 + 62 + 6 maps. [F.]

A manual for private planters, divided as follows:—Part 1, general considerations; Parts 2 and 3, Region A (N.E. France) and Region B (E. France); Part 4, the Alps; Parts 5, 6 and 8, Region D (Nord and Haute-Seine), Region E (Central France) and Region G (W. France); Part 7, Massif central; Part 9, S.W. France and the Pyrenees; Part 10, the Mediterranean region, eastern Pyrenees and Corsica. Each region is further subdivided, and details of climate, soil, and suitable species are given.

1954. GIMENEZ RADIX, L. Labor desarrollada por el Patrimonio Forestal del Estado desde su creación hasta finales del año 1949. [**Work achieved by the State Forest Service from the time of its inception up to the end of 1949.**] *Montes, Madrid* 6 (33), 1950 (367–86). [Span.]

An account of the reforestation work of the Spanish Forest Service with tables and a diagram showing the number of ha. reforested in each province every year since 1939–40.

1955. CRIVELLARI, D. Le murge e il loro rimboschimento. [**Calcareous rocks and their afforestation.**] *Monti e Boschi* No. 1, 1950 (8–14). [It.]

A note on the afforestation of a rocky, calcareous catchment in Apulia for the purpose of flood control, begun in 1928. The principal species used were Aleppo Pine and Common Cypress, but good results were also obtained with *Cupressus arizonica* and *Cedrus atlantica.*

1956. DORIGUZZI, G. Il rimboschimento di Monte Morello. [**The reforestation of Monte Morello.**] *Monti e Boschi* No. 9, 1950 (387–96). 3 refs. [It.]

An account of the reforestation of a mountain to the north of Florence, begun about 1909. The mountain was then almost completely deforested, with rocky, eroded soil. The species principally planted were Austrian and Corsican Pines and Cypress; Oaks (*Q. sessiliflora, Q. ilex,* and *Q. cerris*) were sown direct. Some secondary hardwoods (e.g. Hornbeam, Maples, and *Fraxinus ornus*) were also planted. The principal types of plantation were (1) pure Pines, (2) mixed Pine and Cypress, and (3) mixed Pines, Cypress, and Turkey Oak. Best results were obtained with (1), which at the age of 30 years had reduced the $CaCO_3$ content of the upper soil horizons from 10–15 to 4–6% with a consequent reduction in alkalinity despite the increased N and P_2O_5 content. The Cypress and hardwood stands were much inferior as soil improvers.

1957. MATYUK, I. S. Resultatȳ mezhvidovoy bor'bȳ v lesnȳkh soobshchestv na peskakh. [**Results of interspecific competition in forest communities on sands.**] *Agrobiologiya* 1950 (2), (90–7). [Russ.russ.] [Vsesoyuznȳ Nauchno-issledovatel'ski Institut Agromelioratsii, Moscow.] A.P.B.

Gives further examples from various localities in Southern Russia to supplement those in a previous paper [see *For. Abstr.* 12 (No. 1068)]. Many years of plantation trials on sands show that tree-by-tree mixtures are usually unsuccessful, owing to competition between the different species. Such unsuitable mixtures include:—*Pinus sylvestris* with *Quercus robur, Robinia pseudoacacia,* 'Canadian' Poplar, *Populus nigra, Betula verrucosa, Fraxinus pennsylvanica, Ulmus parvifolia, Acer negundo, Morus alba* or *Pinus pallasiana*; *B. verrucosa* with *Pinus pallasiana*; *R. pseudoacacia* with *Acer negundo, Prunus armeniaca* or *Gleditsia* sp.; *Prunus armeniaca* with *A. negundo* or *Populus nigra.* For the afforestation of sands the author recommends pure stands of *Pinus sylvestris, Populus nigra, R. pseudoacacia, Q. robur, B. verrucosa, U. parvifolia* and *Prunus armeniaca,* with an undergrowth of shrubs to protect the main species from sand drifting, dry winds, and weeds.

1958. SIPKES, C. Doelbewuste klimaatsverbetering door landschapsbehandeling. [**Planned climate improvement by landscape treatment.**] *Tijdschrift der Nederlandsche Heidemaatschappij, Arnhem* 60 (3), 1949 (72–80). [Du.] H.S.B.

The creation of sand dunes along the coast as windbreaks, and the planting of areas behind the dunes, are discussed. Pure coniferous stands are not recommended. Suggested species for preliminary planting are Hawthorn, Willow and Poplar spp., and on better soil Elm, Elder and Tamarisk. Austrian Pine planted near the coast provides shelter for holiday-makers and some good-quality timber. Poplars and *Salix alba calva* are recommended for roadside plantings in exposed areas; small plantations of Hawthorn, Blackthorn and other berry-bearing shrubs for the birds; and *Populus 'deltoides missourensis', P. canescens* and *P. alba* for windy sites. Conifers for such areas are

Austrian Pine, Sitka Spruce (in small quantities and in mixed stands) and *Pinus mugo*. The last is not, however, resistant to sea winds. *Hippophae rhamnoides* and *Elaeagnus* are recommended for resistance to sea winds. [Cf. *For. Abstr.* 9 (No. 242).]

1959. Rao, V. S. **Afforestation of waste lands as practised in West Bengal in combating the soil erosion problem and meeting the scarcity of fuel and fodder, etc.** *Indian For.* 76 (8), 1950 (323–6).

1960. Limstrom, G. A. **Overburden analyses and strip-mine conditions in northeastern Ohio.** *Tech. Pap. Cent. St. For. Exp. Sta.* No. 114, 1950. pp. 44.

The characteristics of soils from open-cast mining are described and tabulated, and their suitability for growing different tree species are briefly discussed. [Cf. *For. Abstr.* 10 (No. 2578).]

1961. Deitschmann, G. H. **Seedling survival and height growth on graded and ungraded strip-mined land in southern Illinois.** *Sta. Notes Cent. St. For. Exp. Sta.* No. 62, 1950. pp. 2.

Experimental plantings were made of 17 species on levelled and unlevelled spoil sites. An examination after 2 years showed that all species except Black Locust had made slightly more height growth on the unlevelled sites. The third year confirmed this result and revealed little difference between survival on levelled or unlevelled sites for the species (Green and White Ash, Black Locust, Sweet Gum, Loblolly Pine, Eastern Red Cedar and Shortleaf Pine) most often used in afforesting spoil areas in Illinois. Results are tabulated. [Cf. *For. Abstr.* 10 (No. 1043).]

1962. Deitschman, G. H. **Comparative survival and growth of trees planted under three types of overhead cover on strip-mined land in southern Illinois.** *Sta. Notes Cent. St. For. Exp. Sta.* No. 63, 1950. pp. 2.

Seeds of Black Walnut and 1-year seedlings of 9 tree species were planted in plots under 9-year Black Locust and 8-year Shortleaf Pine, and in the open. The survival of all trees examined (Cottonwood and Osage Orange were not included in the final examination because of their low initial survival on all sites) was greater under the plantations than on exposed sites. Average survival was 61% in the open, 78% under the Pine and 80% under Black Locust. Differences for Black Walnut, Silver Maple and Yellow Poplar were even greater. With minor exceptions, the height of planted trees was greatest under Black Locust and least under Pine. Results are tabulated.

23.4. *Formation of Forest by Natural Succession*

1963. **[Effect of closing savanna to grazing.]** *Rep. For. Dep. Uganda 1949*, 1950 (27 + 10 photos).

Two plots in different parts of the grasslands of the West Nile highlands were demarcated and fenced in 1941. Grazing is not permitted on these plots, and early burning is practised. Although the tree cover on these plots now presents a great contrast to the surrounding country, its extent is not as great as was hoped. Degradation due to repeated burning and overgrazing is clearly too far advanced for the method to be a success.

23.5. *Underplanting. Nurses. Filling Gaps (Beating up)*

See also *For. Abstr.* 12 (Nos. 1962, 2261).

1964. Page, P. R. **Birch as a forest crop.** *Quart. J. For.* 44 (4), 1950 (217–9).

Notes on the tending of natural or artificial Birch stands and their use as a nurse to shade-bearing conifers such as *Abies grandis*, *Pseudotsuga taxifolia* or *Tsuga heterophylla*. It is concluded that where Birch can be obtained cheaply by natural regeneration, it not only forms a profitable catch crop, but also assists the establishment of shade-bearing conifers.

1965. Šafar. Obnova četinara posredstvom lišćara. **[Regeneration of conifers by means of deciduous trees.]** *Šum. List* 73 (12), 1949 (423–4). [Croat.]

Observations on the natural growth of Beech among Silver Fir on siliceous soils in e.g. north-west Croatia, of Beech in thinned Pines in the Plitvice Lakes region, and of Silver Fir under Spruce in the Gorski Kotar area, lead the author to discuss the favourable effects of such associations for the regeneration of valuable conifers. He advocates introducing Beech and possibly Poplars in conifer stands on

siliceous soil, removing these when conifer regeneration has appeared.

1966. GAINES, E. M. **Scrub Oak helps Longleaf seedlings on deep sand.** *Sth. For. Note Sth. For. Exp. Sta.* No. 69, 1950 (3–4).

Observations of first-year seedlings in Alabama during 1948 and 1949 showed that seedlings on deep sands survived late spring drought better when shaded by Scrub Oak than in the open.

24. TENDING OF STANDS AND TREES

1967. HARRIS, K. F. **Growing good quality second-growth Alder.** *B.C. Lumberm.* 34 (7), 1950 (41, 109–10, 112).

Presents a programme of cleanings and thinnings for naturally regenerated Alder [*Alnus* sp.] interplanted with Black Cottonwood (*Populus trichocarpa*) at 10 × 10 ft. spacing, the whole stand being managed on a 50-year rotation.

1968. CVEK, S. O čiščenju in redčenju naravnega podmladka in mladovja. **[The cleaning and thinning of natural regeneration and young stands.]** *Gozd. Vestn.* 7 (6), 1948 (145–7). [Sloven.]

General observations and advice for forests on the mountainous portions of the Karst region where to-day there is much advance growth consisting of three main types, according to edaphic conditions: (1) Beech predominant, with other hardwoods and struggling Silver Fir seedlings beneath; the Fir should be freed and favoured on suitable sites so as to produce a 50% Fir and 50% Beech forest. (2) Beech mixed with Maple [*Acer* sp.]; here cleanings to favour the Maple are recommended, starting when the young stand is 2 m. high, and always light for fear of snowstorms. The canopy should have closed again 3 years after cleaning. (3) Spruce [*Picea abies*], with a scattering of Beech and Maple on less severe sites. Here the hardwoods should be favoured for their soil-improving qualities.

24.2. *Thinnings*

See also *For. Abstr.* 12 (Nos. 2299, 2491, 2515, 2519).

1969. PETRAČIĆ, A. Biološki odnošaji mješovitih sastojina crne johe i hrasta lužnjaka. **[Biological relations in mixed stands of *Alnus glutinosa* and *Quercus robur*.]** *Glasn. šumske Pokuse* 9, 1948 (1–17). 17 refs. [Croat.f.]

In mixed stands of Alder and Oak that have arisen from invasion of the Oak at a few years of age by natural regeneration of Alder, the Oak will remain alive as an understorey for a long period. By thinnings of the upper storey some 30 years after the establishment of the Alder, a mixed stand may be maintained or conversion to pure Oak effected.

1970. KASTRUKOFF, M. **Strip thinning with tractor winch, Saskatchewan.** *Silv. Leafl. For. Br. Can.* No. 48, 1950. pp. 2.

Trees were uprooted in 10-, 15-, and 20-ft. strips by a tractor-powered winch-and-cable arrangement. The uprooted trees were bunched on the strip and dragged to a landing or natural clearing for disposal. The number uprooted at a time varied with density of stand, size, rooting habit of the species, and the type of soil. In very dense Black Spruce it was possible to loop the cable round as many as 40 trees at once. The most efficient method of uprooting the trees is to use both winch and drawbar, using the winch only to regulate the length of cable required at a particular time, and the drawbar for the actual uprooting. In every case the number of man-hours required per unit basal area removed was less for the strip-thinning method than for ordinary manual methods.

1971. QUAITE, J. **Severe thinning in an overstocked Lodgepole Pine stand.** *Silv. Leafl. For. Br. Can.* No. 47, 1950. pp. 2.

An experimental thinning was carried out in 1941 in part of a 77-year-old stand of *Pinus contorta* var. *latifolia*, when *ca.* 70% of the total cubic volume was removed. Both treated and untreated areas were sampled in 1949. The annual height growth for the 8 years 1941–49 was *ca.* 5 in. for both areas; average diameter growth on the treated areas was 0·8 in. and on untreated 0·4 in.; basal-area increment for 629 trees on each area was 26·8 and 10·3 sq. ft. respectively, and volume increment 652 and 321 cu. ft. By 1949, the thinned portion of the stand had suffered no mortality but 500/acre had died on the other. There was no sign of windthrow or sunscald on the treated area. [Cf. *For. Abstr.* 11 (No. 278).]

1972. JOLLY, N. W. **The thinning of *Pinus radiata* plantations in the south-east**

of South Australia. *Bull. Wds. For. Dep. S. Aust.* No. 4, 1950. pp. 27.

1973. Olberg, A. Die Durchforstung der Kiefer. **[The thinning of Scots Pine.]** M. & H. Schaper, Hannover. 1950. pp. 135. [G.] Price *DM*6.40.

Intended not as a textbook but as a 'companion' to smooth the way from theory to practice, this booklet records the author's 20 years' experience in the thinning of even-aged Scots Pine, both in pure stands and in mixed stands with Pine in the upper storey and hardwoods below, in the Chorin instructional forest of the Eberswalde Forestry School [cf. *For. Abstr.* 3 (118)]. Chapter headings are as follows: (1) Fundamental notions concerning the tending of stands. (2) The volume and value yields of Pine. (3) Stand development and tending before thinning age. (4) The marking of thinnings. (5) The earliest thinnings. (6) Thinnings proper. (7) Felling plan, sequence of fellings and the recording of thinning statistics.

1974. Holsoe, T. **Profitable tree forms of Yellow Poplar.** *Bull. W. Va. agric. Exp. Sta.* No. 341, 1950. pp. 23.

A study was made of 125 trees of *Liriodendron tulipifera* in unmanaged stands in W. Virginia, to determine the effect of various degrees of liberation on tree development and the subsequent growth and lumber grades that can be obtained from trees of different forms. On each tree, the following measurements were taken:—(1) d.b.h., (2) radial growth during the previous 10 years, (3) total height, (4) clear length, (5) crown length, (6) crown diameter, and, whenever possible, (7) age of tree. Curves are presented showing the following relationships:—(3) : (7); (5) : (3); (6) : (3); (1) : (3); (4) : (3); (2) : (5); (2) : (6); (5) : (6). Analysis of the data showed that it is highly uneconomic to develop more than 2 clear 16-ft. logs. The aim of management should be to keep stands reasonably dense until two clear 16-ft. logs have been developed. During this time it is advisable to maintain a crown length of about half the total height. After this clear length has been attained, the object will be to keep alive any branches above the two logs. This can be done only through repeated thinnings made as soon as the crowns of the individual trees begin to touch their neighbours. In this way it is possible to develop trees which at a total height of 100 ft. will have a crown length of *ca.* 60 ft. Such trees will show much faster growth, reach merchantable size quicker, and maintain a much better compound-interest rate than trees with 3 clear logs and 33·4% crown length. [Cf. *For. Abstr.* 10 (Nos. 242, 2327).]

1975. Mackenzie, A. M. **Douglas Fir sample plots at Beaufort, Inverness-shire** *Scot. For.* 4 (4), 1950 (94–7).

Compares present main crop per acre on 3 sample plots of Douglas Fir established, (1) in 1919 and (2) and (3) in 1921. Plot (1) was treated by selecting 'élite' trees and thinning from above to promote their development, plots (2) and (3) by heavy and light low thinning respectively. In 1949 the number of trees per acre in the 3 plots was 156, 159 and 396 respectively. The degree of thinning had had no appreciable influence on taper or stem form, and no significant influence on total basal area, height, or volume production, but the heavy thinnings in (1) and (2) had stimulated girth increment and distributed volume to the benefit of selected trees. M.a.i. closely agrees in the 3 plots.

Of the 170 'élite' trees/acre on plot (1), about one-half were pruned to a height of 28 ft. in 1919, and all were girthed at breast height and at 14 ft. above ground, to obtain the volume of the first 28-ft. log. At each of the 7 re-measurements, made between 1919 and 1949, the girth at 14 ft. has consistently averaged 85% of g.b.h. The volume of the 28-ft. log divided by the volume of a cylinder having a basal area equal to the g.b.h. also gives a nearly constant figure of 0·72. The data demonstrate the importance of the first 28-ft. section of the growing trees, for even now that they are over 100 ft. high, it still contains practically half the total volume of the tree. High pruning has strikingly improved the appearance of the treated trees, for branch cuts have occluded perfectly. The pruned knotty core, averaging 4 in. in radius at b.h. is now surrounded by a 4½-in. zone of clear wood.

24.3. *Opening of the Canopy. Release and Improvement Fellings (including Poisoning and Girdling)*

See also *For. Abstr.* 12 (Nos. 1911, 2082).

1976. Daly, E. G. **Improvement cutting in a mixedwood stand. Project P-24.**

Silv. Leafl. For. Br. Can. No. 46, 1950. pp. 3.

The stand under consideration was about 45 years old and originated from fire after logging. It was composed of 60–70% Balsam Fir and Spruce, 10–20% Red and White Pine, and 15–25% Poplar, Birch, Maple and Ironwood. On two plots, most of the overtopping hardwoods were removed and the denser patches of conifers thinned to improve spacing. This reduced the average total basal area/acre from 160 to 101 sq. ft. The diameter increment of the 100 largest Spruce and Balsam on the treated plot in the 19-year period after treatment was *ca.* 50% greater than for comparable trees on controls. A summary of the growth of all species and for the coniferous trees alone is tabulated. Since a large % of the stand consists of Balsam Fir, which is highly susceptible to butt rot, it is expected that the beneficial effects of the treatment will be offset by loss of volume from wind breakage unless the trees are harvested at once.

1977. Johnson, J. W. **Commercial improvement cut in bottomland hardwoods.** *Sth. For. Note Sth. For. Exp. Sta.* No. 69, 1950 (1–2).

A stand of mixed hardwoods (mostly Oaks and Sweetgum) was subjected to an improvement felling which removed 1,500 of its 2,900 bd. ft per acre. The remaining trees were examined 2 years later. Trees that had received heavy release (more than ½ the effective competition to suppressed trees and more than ¾ of competition to intermediates and co-dominants) were found to be increasing in diameter at a rate 26% faster than in the 10-year period before the felling. The best response came from trees less than 18 in. in d.b.h. Trees receiving medium release showed no appreciable change in growth rate, while, those with light or no release decreased 17% the rate of decline that could have been expected from the whole stand if no cut had been made.

1978. Arend, J. L., and Monroe, A. F. **Growth in two Oak woodlots following an improvement cut.** *Tech. Notes Lake St. For. Exp. Sta.* No. 342, 1950. pp. 1.

24.4. *Shelterbelts. Windbreaks*

1979. Home, Sir J. M. **Shelter woods or belts.** *Leaflet, Department of Agriculture for Scotland* No. 5 (*n.s.*), 1949. pp. 8.

Notes on lay-out, choice of species, and methods of planting and tending shelterbelts in Scotland.

1980. Olbrich, A. Windschutzpflanzungen. [**Shelterbelts.**] Verlag M. & H. Schaper, Hannover. 1949. pp. 84. [G.] Price [10*s.*]

Contains the following sections:—(A) the hedges of Holstein (16 pp.); (B) shelterbelts in U.S.A., Denmark etc. (3 pp.); (C) shelterbelt operations in the Ukraine (35 pp.); (D) principles and practice of hedge planting (10 pp.); (E) afforestation for wind protection in the Rhön-Gebirge (4 pp.); (F) stubble-mulching; (G) strip cropping (5 pp.).

1981. Overdijkink, G. A. Het aanleggen van beplantingen tegen verstuiving. [**The lay-out of shelterbelts and hedges to prevent wind erosion.**] *Maandblad voor de Landbouwvoorlichtingsdienst, 's-Gravenhage* 5 (11), 1948 (538–44). [Du.] A.P.B.

1982. Bakker, H. C. Het windscherm en zijn behandling. [**The windbreak and its treatment.**] *Fruitteelt, Den Haag* [39], 1949 (990–1, 1022). [Du.] E.M.B.

The value of windbreaks for orchards is emphasized and brief advice is given on clipping, manuring and spraying Willow, Lombardy Poplar and Hawthorn used for this purpose.

1983. Hille Ris Lambers, D. Enige bezwaren van windschermen. [**Some disadvantages of windbreaks.**] *Maandblad voor de Landbouwvoorlichtingsdienst, 's-Gravenhage* 5 (11), 1948 (536–8). [Du.] A.P.B.

Euonymus europaeus, Viburnum opulus, Rhamnus catharticus, Lombardy Poplar, Elm (especially *Ulmus campestris* var. *suberosa*) all act as hosts to insects that damage vegetable or fruit crops.

1984. Mestre, L. La haie de cyprès, abri contre le vent. [**The Cypress hedge as a windbreak.**] *L'Agriculteur provençal, Marseille* 49 (1105), 1950 (1). [F.]

Recommends the planting of *Cupressus sempervirens* var. *pyramidalis* hedges as windbreaks. It has the advantages of occupying little space (about 1 m. compared with 3–6 m. for a hedge of *C. macrocarpa*), offers less competition to crops than do most of the trees

and shrubs used for the purpose, and is more resistant to drought and low temperatures than *C. macrocarpa*. Directions are given for soil preparation, planting, spacing and tending. It is recommended that spacing should be close (50–75 cm. or even closer on arid sites), and the hedge thinned at about 5 years old. Staking is advisable on windy sites until the trees are some 4 years old. Protection against rabbits is necessary in the early stages and it is claimed that some insecticides with a base of 666 have given good results as rabbit repellents.

1985. STOECKELER, J. H. **Shelter belts in Italy.** *Foreign Agric.* 14 (9), 1950 (196–8). E.M.B.

Notes on shelterbelts in the Pontine Marsh. [Cf. *For. Abstr.* 9 (No. 896).]

1986. ISACHENKO, T. I. O estestvennom rasselenii drevesno-kustarnikovykh porod v Kamennoy Stepi. [**Natural colonization by tree and shrub species in the Kamennaya Steppe.**] *Bot. Zh. S.S.S.R.* 35 (3), (233–46). 5 refs. [Russ.] P.R.

Records, with diagrams of quadrats and transects, natural regeneration of trees and shrubs on both fallow and steppe areas adjacent to shelterbelts. The most successful of the invading woody species were *Acer tataricum*, *A. platanoides*, *A. negundo*, *Crataegus monogyna*, *Ulmus foliacea* and *U. suberosa*. Regeneration was from seed in most cases, but in the case of Elm, by suckering. It was most successful where the herbaceous vegetation was disturbed, and under the canopy of the shelterbelts (where snow accumulates, weeds are weakened by shade, and some protection is afforded against frost and cattle). The first woody colonizers were probably Elm and Hawthorn, and the latter, owing to its dense crown, appeared to be a good nurse for tree and shrub regeneration. Stress is also laid on the value of the litter of woody species in helping to suppress steppe weeds. [Cf. *For. Abstr.* 12 (No. 2318).]

1987. PRISYAZHNYUK. A. A. Dubovye nasazhdeniya v zapovednike 'Streletskaya Step'.' [**Oak stands in the 'Streletskaya Step'' forest reserve.**] *Agrobiologiya* 1950 (2), (98–100). 1 ref. [Russ.] [Vsesoyuznyy Nauchno-issledovatel'ski Institut Agrolesomelioratsii, Moscow.] A.P.B.

In this locality a type of 'nest' sowing of Oak was practised over 20 years ago. Steppe that had been under agricultural crops since 1923 was ploughed in 1-m. strips, with 2-m. unploughed strips between, in October 1927, and acorns were sown in that month in 'nests' of 1 sq. m. (each with 6 rows of 7 acorns set 8–10 cm. deep), spaced 2·5 m. apart on the ploughed strips. The Oak was weeded annually in 1928–30 and then left untended. The unploughed strips were not weeded. The canopy closed at about 10 years of age, and in 1949 these sowings had developed into some 33 ha. of healthy pure Oak woods on flat and gently sloping steppe where no forest had previously existed.

The 'nests' showed 18–35 survivors each, of which a few were 6–8 cm., with some others 4–6 cm., and the rest less than 1 cm. in d.b.h. Dominants averaged 5–7 m. high with a c.a.i. of 50 cm. Under the canopy, ground vegetation covered only 5–10% of the area, consisted chiefly of forest species, and could have no effect on Oak growth. Row plantings of Oak which were made almost simultaneously have generally been failures owing to severe competition from the steppe vegetation.

1988. DOKUCHAEV, V. M. Posev duba gnezdovym sposobom v zasushlivoy zone. [**Direct sowing of Oak by the 'nest' method in the drought zone.**] *Agrobiologiya* 1950 (1), (134–7). [Russ.] A.P.B.

A further report of first-year success in raising Oak for shelterbelts by Lysenko's 'nest' method [cf. *For. Abstr.* 12 (Nos. 1119–21)], the trials in this case being made by the Cotton-growing Research Institute near Stavropol and in Dagestan, in conditions of severe drought in 1949.

1989. LYSENKO, T. D. Posev polezashchitnykh lesnykh polos gnezdovym sposobom. [**Direct sowing of shelterbelts by the 'nest' method.**] *Agrobiologiya* 1949 (5), (9–27). [Russ.] A.P.B.

Experience from trials has shown that Oak shelterbelt sowings of the 'nest' type have come up successfully even when the whole area, including the 'nests', was sown to crops such as lucerne, oats, barley and winter wheat, and that a cover of such crops eliminates the need for weeding the Oak patches [cf. *For. Abstr.* 12 (Nos. 1119–21)]. In consequence, Lysenko presents the following modifications to his

original method [see *For. Abstr.* 11 (No. 289)]: (1) After sowing the Oak, a continuous sowing is made of an agricultural crop (alternatively the Oak can be sown in a pre-existing agricultural crop). (2) In the following autumn, after harvesting, the interspaces are disked but the 1-m. strips containing the Oak 'nests' remain untouched. Rye and small-seeded shrubs are then sown by a 24-row drill on the disked strips; any large-seeded shrubs must be sown by hand. The 1-m. strips are sown to rye with a 10-row drill, and the auxiliary tree species by hand (one spot sowing of the auxiliary midway between each Oak 'nest' and the next). (3) In the following year, the rye is harvested, leaving high stubble to catch snow, and rye is sown without previous cultivation on the 4-m. interspaces only, since the Oak needs overhead light and only lateral protection in its third year. (4) Procedure is then as in the original method.

The advantages of the modified technique are greater protection for the Oak, and reduced labour requirement and costs.

Details are given of acorn storage in trenches and sowing procedure. Stress is laid on the need for periodic sampling of the acorns during winter, and especially 1–1½ months before sowing, when, if there is little sign of germintion, the acorns should be transferred in open weather to a building where they should be kept mixed with moist earth in a layer 15–20 cm. deep and at a temperature of 7–12° C.

1990. FERBER, A. E. **Dahurian Buckthorn—a new shrub for conservation plantings.** *J. Soil Wat. Conserv.* 5 (3), 1950 (133–4).

Rhamnus dahurica is showing considerable promise as a shelterbelt shrub species in N. Dakota. It is easy to propagate, free from insects and diseases (unlike *R. cathartica*, which is an alternate host for oat rust), its prolific seed production makes it a good wildlife food plant, and it is very resistant to drought and cold.

1991. AIKMAN, J. M. **Response of the Multiflora Rose to growth conditions in southern Iowa.** *Proc. Iowa Acad. Sci.* 56, 1949 (87–94). 4 refs. A.P.B.

Presents data from experiments in planting hedges of *Rosa multiflora* var. *thunbergiana*. Survival, rate of growth, temperature, soil and site requirements are all dealt with.

24.5. *Pruning*

See also *For. Abstr.* 12 (No. 1975, 2292–5, 2459).

1992. ZELENSKAYA, E. D. O vliyanii obrezki na izmenenie biokhimicheskogo sostava derev'ev yabloni. [**The effect of pruning on the changes in biochemical composition of Apple trees.**] *Dokl. vsesoyuz. Akad. sel.-khoz. Nauk Lenina* 14 (10), 1949 (41–4). [Russ.] L.S.

Pruning causes considerable stimulation of biochemical processes in Apple trees. The sugar content of twigs increases at the beginning of growth, owing to higher hydrolysis of starch in the roots. In the latter half of summer the trees contain more starch in the twigs (and in autumn in the roots) than controls. Early in the spring the bulk of the food (carbohydrates, N) is found to be in the roots and, partly, in the stem.

3. FOREST UTILIZATION. FOREST TECHNOLOGY

1993. **Report of the second meeting of the Latin-American commission for forestry and forest products.** FAO, Washington. No. F/49 LA.Doc.15 [1950?]. pp. 9. P.R.

Report of the meeting referred to in *For. Abstr.* 11 (2), p. 277. Includes a list of recommended commercial names (Spanish) for 41 forest species.

1994. **Reports of the Forest Products Research Board, with the reports of the director of forest products research for the years 1939–1947.** H.M. Stationery Office, London. 1950. pp. 94 + 16 photos. Price 3*s.* 6*d.*

A summary of work for 1939–45, and separate, more detailed, reports for 1946 and 1947.

1995. HENDERSON, F. Y. **The work of the Forest Products Research Laboratory, Princes Risborough, for the African colonies.** *Communication, African Regional Scientific Conference, Johannesburg* No. *B* (i) 3, 1949. pp. 4.

1996. CAMPREDON, M. J. Essais et recherches sur les bois et leur utilisation. [**Tests and research work on wood and its use.**] *Ann. Inst. tech. Bâtim. Trav. publ., Paris* (*n.s.*) No. 45, 1948. pp. 16. [F.f.e.] P.R.

Describes work done in 1947–48 at the Laboratoire de l'Institut National du Bois, Paris, on various glues and glue cement compositions as well as on glued joints of various descriptions. The advantages of lamination were demonstrated in the manufacture of curved units, units of large cross-section, and for certain joints. Other research concerned the creep of wood, waterproofing and antiseptic agents, and the manufacture of wallboards from sawdust and shavings, using synthetic resins. *From author's summary.*

31. PROPERTIES AND ANATOMY OF WOOD. WOOD RESEARCH

See also *For. Abstr.* 12 (Nos. 1880, 2219–20).

31.0. *General Information on Woods*

See also *For. Abstr.* 12 (Nos. 1719, 2464).

1997. **[Bibliography on] *Pinus radiata*: (Utilization). References from D[ivision of] F[orest] P[roducts] Library Catalogue.** *Bibliogr. Ser. For. Prod. Aust.* No. 33*A* (rev.) 1948. pp. 10. 125 refs.

1998. LATHAM, B. **Hardwood survey—4. The commercial timbers of Asia. 5. Australasia.** *Wood* 15 (9; 10), 1950 (309–12, 347–50).

1999. **Terminology. Hong Kong.** [*Proceedings of the F.A.O.*] *Technical Meeting on Standardization of Nomenclature, Terminology, Testing Methods, Grading and Dimensions of Timber, Dalat, Vietnam* No. *F50/FE/22*, 1950. pp. 2. P.R.

A list of fourteen timbers, giving the locally used name, the Chinese name and the botanical name.

2000. **Specimen woods Nos. 177–80.** *Suppls.* to *Wood* 15 (9–12), 1950 (315–6; 351–2; 407–8; 457–8).

Chilean Pine (*Araucaria araucana*); Muhimbi (*Cynometra alexandri*); Yellow Sterculia (*Sterculia oblonga*); and Nyankom (*Tarrietia utilis*).

2001. LAMB, G. N. **Foreign woods, origin, use, properties and nomenclature.** *Wood Prod.* 55 (9–10), 1950 (26, 28; 26).

(*a*) Sabina (*Juniperus gracilior*), Tamo (*Fraxinus mandshurica*), Satinwood (*Zanthoxylum flavum*), and Ebony (*Diospyros* spp.).

(*b*) Boarwood (*Symphonia globulifera*); Sneezewood (*Ptaeroxylon obliquum*), and Stinkwood (*Ocotea bullata*).

2002. SCHMIDT, E. Übersee-Hölzer. Nr. 20–2. [**Foreign woods. Nos. 20–2.**] *Suppls.* to *Weltholzw.* 2 (8–10), 1950. Each pp. 2. P.R.

Niangon (*Tarrietia utilis*); Bruyère [*Erica arborea*?]; and Ossol (*Symphonia globulifera*).

2003. WALKER, A. L'Iboga et le faux Iboga du Gabon. [***Tabernanthe iboga* Baill. and *Tabernanthe* sp. of Gabon.**] *Rev. int. Bot. appl. Agric. trop.* 29 (325/6), 1949 (630–1). [F.] P.R.

2004. FRISON, E. Structure du bois de bushaie (*Lebrunia bushaie*—Guttiferae): valeur et possibilités d'emploi. [**The structure of *L. bushaie* wood: value and possible uses.**] *Bull. agric. Congo belge* 41 (3), 1950 (714–30). [F.flem.]

2005. RANGHEL GALINDO, A. El comino crespo—madera preciosa de los bosques colombianos. [***Aniba* sp., a valuable timber from the Colombian forests.**] *Agric. trop., Bogotá* 6 (1), 1950 (25–7. [Span.] A.P.B.

Properties and uses of the timber, with notes on its special suitability for railway sleepers.

2006. SPOON, W. Toepassingen van walaba of bijlhout. [**Uses of Wallaba [*Eperua* spp.].**] *Ber. HandMus. ind. Inst. Amst.* No. 218, 1947. pp. 11. 19 refs. [Du.du.e.] *Repr.* from *De West-Indische Gids* 28 (10), 1947 (289 *et seq.*).

Reviews literature on possible uses as a pulpwood and for charcoal and gas production. Gives results of Dutch research on the tannin from the wood, especially the heartwood. Results were encouraging, the tannin being of the same quality as Quebracho. Tannin content varies with species and is probably highest in *E. falcata*. The spent chips are not suitable for papermaking, since mechanical comminution for tannin extraction damages the fibres too much.

31.1. *Structure. Anatomy. Identification*

See also *For. Abstr.* 12 (Nos. 1885, 2162–3, 2230, 2464).

2007. MARTS, R. O. **Application of fluorescence microscopy and photomicrography to woody tissues.** *Stain Technology, Geneva, N.Y.* 25 (1), 1950 (41–4). L.S.

Describes a procedure for making preparations of woody tissues for visual observation or photography, by incident-light fluorescence microscopy. Claims the following advantages: (1) reliable recognition of anatomical characteristics without histological techniques, (2) examination of larger areas of wood blocks, (3) visual observation (and photography) of tissues and cell structure in both dry and nearly fresh condition, (4) colour contrast without using stains, (5) improved colour contrast by use of Congo red. *From author's abstract.*

2008. NARAYANAN NAMBIYAR, V. P. **Study of the scattering of light in extracts of seasoned and unseasoned timber woods.** *Science and Engineering, Calcutta* 2 (5), 1949 (92–4). 6 refs. L.S.

[Cf. *For. Abstr.* 11 (No. 1842).] The results of the investigation of depolarization of light scattered transversely in extracts (CCl_4, Et_2O, $CHCl_3$, C_6H_6) of seasoned and unseasoned specimens of Mango wood (*Mangifera indica*) show that (1) the depolarization factors have a distinct tendency to be higher in the unseasoned specimen, probably owing to greater relative size, shape and anisotropy of elements contributing the optical non-homogeneity, (2) CCl_4 gives the lowest, and C_6H_6 the highest depolarization factors.

2009. RENO, J., and KUKACHKA, B. F. **Reno-Kukachka wood identification chart No. 1. Commercial hardwoods.** [**Parts 8–9.**] *Wood, Chicago* 5 (8–9), 1950 (20–1; 24–5). P.R.

Tabular keys for the identification of (8) *Liquidambar styraciflua*, 'Mahogany', and *Prunus serotina*; (9) Dogwood (*Cornus florida*) and Persimmon (*Diospyros* sp.). [Cf. *For. Abstr.* 12 (No. 1148).]

2010. HESS, R. W. **Identification of *Swietenia* and *Carapa*.** *Trop. Woods* No. 9 1950 (47–50).

Details some anatomical characteristics useful in distinguishing *S. macrophylla* and *C. guianensis*.

2011. HESS, R. W. **New genera of American woods.** *Trop. Woods* No. 96, 1950 (50–5).

Notes on the anatomy of some timbers new to the Yale collections, viz. *Mendoncia gigas*, *Huertea glandulosa*, *Tiparvia guianensis* *Ephedranthus guianensis*, *Zeyhera montana* and *Chiranthodendron pentadactylon*.

2012. HESS, R. W. **Classification of wood parenchyma in dicotyledons.** *Trop. Woods* No. 96, 1950 (1–20 + 32 photos). 13 refs.

In an attempt to formulate a comprehensive and workable classification of wood parenchyma patterns, three arrangements formerly in use are described and their deficiencies noted, and a fourth system is evolved and recommended for study and adoption. A symbolic code is presented, by which parenchyma descriptions

can be recorded by means of a simple 'formula', and revisions of some terms listed in the 'Glossary of Terms' of the International Association of Wood Anatomists are put forward.

2013. Bisset, I. J. W. **I. Bibliography of references on the variations of tracheid and fibre lengths and their distribution in angiosperms and gymnosperms. II. Summarized data on the variation of fibre and tracheid lengths and their distribution in angiosperms and gymnosperms.** *Bibliogr. Ser. For. Prod. Aust.* No. 37, 1949. pp. 5 + 5. 47 refs.

2014. Chowdhury, K. A., and Ghosh, S. S. **The formation of growth rings in Indian trees. Part V. A study of some discs of Sandalwood (*Santalum album*).** *Indian For. Rec.* (*Wood Technol.*) 1 (2), 1950 (16–27 + 14 photos, 1 gph). 31 refs.

From a study of fresh material, including (for the first time) microscopic examination, it is concluded that the age of Sandal cannot be determined by ring counting. Of 9 different histological features shown to cause rings, only 3 are actually responsible for true growth rings and these of a faint sort. The peculiar physiology of this parasitic species is thought to render it prone to false ring formation.

2015. **Balsa wood grown in Ceylon.** *Rep. For. Prod. Res. Bd., Lond. 1939–47*, 1950 (19–20).

From an examination of the wood structure of a limited quantity, it seems that Balsa of a quality suitable for export could be grown in Ceylon, if care were exercised in selecting sites for its cultivation. [Cf. *For. Abstr.* 8 (No. 1669).]

31.2. *Physical Properties*

See also *For. Abstr.* 12 (No. 2121).

2016. Horvat, I. Prilog poznavanju tehničkih svojstava munikovine (*Pinus heldreichii* Christ. var. *leucodermis* [Ant.] Markgraf). **[The properties of wood of *P. heldreichii* var. *leucodermis*.]** *Glasn. šumske Pokuse* 9, 1948 (157–71). 9 refs. [Croat.f.]

Presents results of tests on 144 specimens from a single tree, made at the Institute of Forest Technology, Zagreb University. In a comparison with the properties of *P. nigra* var. *austriaca* from the same site, it emerged that values for width of annual rings, % of summerwood, specific gravity, bending strength, shock resistance and compression parallel to the grain were smaller for *P. heldreichii* var. *leucodermis*, whereas those for shrinkage (both linear and volumetric) in the same species were greater.

2017. Horvat, I. Istraživanja tehničkih svojstava crne borovine. **[Properties of the wood of *Pinus nigra* var. *austriaca*.]** *Glasn. šumske Pokuse* 9, 1948 (173–229 + 1 tbl.). 33 refs. [Croat.f.]

Presents the results of research done at the Institute of Forest Technology, Zagreb University; discusses the area of distribution and subspecies of *P. nigra*, giving some data on the area of the *P. nigra* var. *austriaca* forests in Bosnia; reviews research already made into the properties of the wood; details origin, choice of material and test methods; and discusses the results. Specific gravity is greatest in wood having annual rings 1·0 mm. wide, and increases with an increase in the width of the summerwood. In sapwood, annual rings are narrower, sp. gr. and static bending strength are less, and values for shrinkage, compression parallel to the grain, and shock resistance are greater, than in the heartwood. Wood grown on soils over serpentine has slightly wider annual rings, slightly less summerwood, higher sp. gr., and greater values for shrinkage, compression parallel to the grain, static bending strength and resistance to shock, than wood from trees grown on soils over limestone.

2018. **Timber seasoning and utilization.** *Rep. Dep. For. S. Afr. 1948–9*, 1950 (8).

An investigation of the properties of wood from 25- and 30-year-old *Pinus taeda* plantations was made on samples of 30 trees from each. The wood from the 25-year-old trees had an average air-dry weight of 35 lb./cu. ft. and a modulus of rupture of 12,060. The corresponding figures for 30-year-old trees were 29 lb./cu. ft. and 9,600.

2019. Giordano, G. Le principali caratteristiche del legno di eucalipto dei rimboschimenti italiani. **[The principal characteristics of the wood of Eucalypts from Italian plantations.]** *Monti e Boschi* No. 9, 1950 (420–5). [It.f.e.]

Gives sp. gr., resistance to axial compression, resistance to static bending, and resistance to suddenly applied loads, for *E. maideni*, *E. globulus*, *E. botryoides*, and *E. rostrata*. Radial, tangential, and radial/tangential shrinkage are given for *E. globulus* and *E. rostrata* from several provenances. It is recommended that research should be undertaken to determine whether it is possible to avoid or reduce the principal defects of these timbers—frequency of interlocking grain and tension wood, and excessive shrinkage.

2020. NARAYANAMURTI, D., and PRASAD, D. N. **The damping capacity of some Indian timbers.** *Journal of the Aeronautical Society of India, New Delhi* 1 (3), 1949 (30–7). 5 refs. L.A.S.

Presents the results of experiments on the damping capacity of 22 air-dry Indian timbers. The logarithmic decrement in torsion varies from about 0·0257 for a *Chikrassia tabularis* specimen (moisture content 8·8%) to 0·0688 for a *Bauhinia retusa* specimen (moisture content 18·8%). In all cases the values for specimens cut at an angle of 45° are higher than for those cut parallel to the grain. Impregnation with water increased the damping capacity.

31.22. Relation to Water, Air, Gases

See also *For. Abstr.* 12 (Nos. 2016–7, 2019).

2021. **Bibliography of literature on wood-water relation and relative topics to 1948.** *Bibliogr. Ser. For. Prod. Aust.* No. 35, 1949. pp. 34. 324 refs.

2022. PFALZNER, P. M. **On the flow of gases and water vapour through wood.** *Canad. J. Res.* 28*A* (4), 1950 (389–410). 17 refs. P.R.

The quantities of water vapour passing through wood have been measured under the conditions of hydrodynamic flow and of kinetic diffusion. Air and oxygen pass through wood under hydrodynamic flow conditions in accordance with the Knudsen-Poiseuille law. Water vapour passes through wood under hydrodynamic flow conditions in much larger quantities than those predicted by the law. The rate of passage of water vapour under diffusion conditions follows the Fick diffusion law but with a diffusion coefficient that increases with relative humidity. The distinctive features of the diffusion and hydrodynamic flow processes are pointed out. Porous, hygroscopic media permit the transfer of water vapour either by diffusion or by hydrodynamic flow, as determined by two distinct sets of conditions, while compact, hygroscopic media permit the transfer of water vapour by diffusion only, regardless of the external conditions. *Author's summary.*

2023. GRAHAM, R. D. **Resin coated electrodes.** *Wood, Chicago* 5 (9), 1950 (20, 46–7). P.R.

Presents results obtained with coated steel electrodes used with resistance-type moisture meters for measuring the moisture content of wood having abnormal moisture distributions or of laminated products in which the glue lines may interfere with the measurements. The coated electrodes were found to be more accurate than uncoated ones for measuring normal as well as abnormal moisture distributions in wood.

2024. SMITH, E. M., and DICKINSON, F. E. **The calibration of two types of moisture meters for several tropical woods.** *Tech. Rep. Yale Sch. For.* No. 3, 1950. pp. 4 + 3 tbls. 1 ref.

Cf. *For. Abstr.* 11 (No. 1857).

2025. STEVENS, W. C. **The movement of timber.** *Wood* 15 (8), 1950 (282). [Forest Products Research Laboratory, Princes Risborough.]

Describes, briefly, a standard test used at Princes Risborough to investigate movement in timber. Quarter- and slash-cut specimens (at about 12% moisture content) are conditioned at a temperature of 77° F., first in air at 90%, and then in air at 60% humidity. The moisture-content values of the specimens when in equilibrium at the two humidities are determined with the movements corresponding to the particular moisture-content range. Results of tests on 13 species are listed.

2026. TINTO, J. C. Determinación del grado de penetrabilidad en maderas argentinas. **[Determination of penetrability of Argentine woods.]** *Publ. téc. Minist. Agric. Argent.* No. 12, 1949. pp. 19. 16 refs. [Span.span.] [Administración Nacional de Bosques.] P.R.

Experiments were made with 41 Argentine timbers to determine their penetrability. Specimens were impregnated with a mixture of creosote and gas oil, using the Lowry process and a pressure of 6 atm. A classification of the timbers according to their penetrability is presented.

31.23. Weight. Specific Gravity

See also *For. Abstr* 12 (Nos. 2016–9, 2164).

2027. KOLLMANN, F. Bestimmung des Raumgewichtes der Hölzer. [**Determination of the density of wood.**] *Repr.* from *Handbuch der Werkstoffprüfung* (Julius Springer, Berlin) 3, 1941 (42–45). 10 refs. [G.] P.R.

Summary of German industrial standard (DIN) tests.

31.24. Calorific Value

2028. AGUILAR, L. **Calorific values of Philippine woods.** *Philipp. J. For.* 6 (2), 1950 (217–25 + 1 gph.). 4 refs.

For the purposes of this study, 72 samples made up of 50 species, were used, and the data are set out in tabular form, showing for each sample, its species and provenance, cal. per kg., cal. per cu. ft., B.Th.U. per lb., B.Th.U. per cu. ft., and weight in lb. per cu. ft., all moisture-free. Statistical analysis of the data gave a high coefficient of correlation (0·942) between density and calorific value of wood.

31.25. Hardness. Resistance to Abrasion

See also *For. Abstr.* 12 (No. 2210).

2029. SORETZ, S. Werkmässige zerstörungsfreie Holzprüfung. [**Non-damaging testing of wood in industry.**] *Mitt. öst. Ges. Holzforsch.* 2 (5), 1950 (120–2). [G.] P.R.

Discusses various (static and dynamic) hardness testing methods and recommends Baumann's method for measurements on the felling site or in a sawmill.

2030. **Abrasion test: Muhimbi timber.** *Rep. For. Dep. Uganda 1949*, 1950 (21–2).

An abrasion test was made at the Forest Products Research Laboratory to determine the relative resistance to wear of Muhimbi (*Cynometra alexandri*) and to assess its suitability for heavy-duty flooring. It is a hard, heavy, reddish-brown timber weighing about 52 lb./cu. ft. at 12% moisture content. The rate of wear as reflected by quantitative loss was low; the % loss of weight for rift-sawn and flat-sawn material was ca. 1½ and 1% respectively, values rather less than those obtained for flooring hardwoods of high repute.

31.27. Mechanical Strength

See also *For. Abstr* 12 (Nos. 1996, 2016–9, 2054, 2121, 2174, 2215).

2031. WANGAARD, F. F. **The mechanical properties of wood.** John Wiley & Sons, Inc., New York. 1950. pp. 12 + 377. Many refs. Price $6.00. P.R.

A complete revision of G. A. Garratt's work of the same name (1931), including sections on the basic mechanical properties of clear wood, factors affecting the mechanical properties of wood, working stresses for structural timber, and timber testing. Appendices give the nomenclature of American woods and a set of standard instructions for collecting and testing small clear specimens of wood. The book includes numerous photographs, microphotographs, diagrams, graphs and tables, and a list of over 200 references.

2032. **Timber Mechanics Conference, September 27–October 22, 1948.** Standing Committee on Forest Products Research, Empire Forestry Conference. [1949?] pp. 21 + 123 + 9 + 5 + 1 tbl. Proceedings of the Conference. [Cf. *For. Abstr.* 10 (No. 2620).]

2033. KLOOT, N. H. **A new testing machine to help in the growing of better grade timber.** *For. Prod. News Lett., C.S.I.R.O. Aust.* No. 181, 1950 (3–4).

A micro-tensile testing machine, designed and made by the Division of Forest Products, C.S.I.R.O., is capable of testing specimens 1/16 in. wide and only 3/1,000 in. thick, thus permitting tests on material grown only in a limited period during which a known silvicultural treatment was employed. Such data are not yet available, but preliminary tests indicate the usefulness of the instrument.

2034. **Elastic and plastic properties of timber.** *Rep. For. Prod. Res. Bd., Lond. 1939–47*, 1950 (59).

Tests designed to measure the effect of humidity on the creep of ½-in. Douglas Fir plywood have failed to show any significant difference in the creep as measured at 30, 45 and 60% relative humidity (r.h.); at 75% r.h., however, the creep is appreciably greater, and when measurements at 90% r.h. are completed a further increase is expected. [Cf. *For. Abstr.* 9 (No. 2261).]

Some experiments have been made on the effect of long-continued loading on the Young's modulus of Beech as measured by a flexural vibration method. At 90% r.h. and under a load involving a maximum fibre stress of about 5,000 lb./sq. in., the modulus increases by 4–5% over a period of a few days. The effect is approximately reversible, so that, on unloading, the modulus drops, and increases again when the load is re-applied. At 45% r.h., there are signs of the same effect, but the changes in modulus are hardly greater than the experimental error.

Some experiments are also in progress on the combined effect of temperature and moisture content on the 3 rigidity moduli of Sitka Spruce.

2035. FUKADA, E. **Vibrational study of the wood used for the sound boards of pianos.** *Nature, Lond.* 166 (4227), 1950 (772–3). [Kobayashi Institute of Physical Research, Kokubunji, Kitatama, Tokyo.]

Measurements were recorded of the dynamic Young's modulus and the logarithmic decrement of Spruce [*Kuroezomatsu*] which is used for the soundboards of pianos, and observations made of the differences in these physical quantities in specimens selected by a piano maker as suitable or unsuitable for soundboards. The piano maker is guided in his choice simply by experience. It was found that suitable material (*a*) had annual rings *ca.* 1–2 mm. wide, and unsuitable material (*b*) rather wide annual rings (*ca.* 3 mm.). Young's modulus was higher and the logarithmic decrement smaller for (*a*) than for (*b*). The frequency character of the logarithmic decrement varied considerably with the moisture content and the temperature. Young's modulus decreases with temperature, as does decrement, and the maximum frequency became larger.

2036. DOSOUDIL, A. Dynamische Festigkeit von Platten. **[Impact strength of panels.]** *Svensk PappTidn.* 53 (19), 1950 (609–12). [G.e.] P.R.

Whole panels of solid wood, veneer, and fibreboard, were fastened to a frame and subjected to impact tests with a special apparatus (not described) by which the energy necessary to break through the panels can be measured. Photographs illustrating the results are given. Preliminary results of investigations of the relationship between thickness and impact strength are shown in a graph. In fibreboards, no clear relationship exists between thickness and strength.

2037. KOLLMANN, F. Die Festigkeit des Eschenholzes. **[Strength of Ash wood.]** *Extr.* from *VDI-Zeitschrift* 87 (7/8), 1943 (115–6). 2 refs. [G.] P.R.

2038. PILLOW, M. Y. **Guides for selecting tough Ash.** *Sth. Lumberm.* 181 (2264), 1950 (42, 46, 48, 50, 52). 8 refs. [Forest Products Laboratory, Madison.]

Factors to be considered in selecting tough Ash of the 'White Ash' group [*Fraxinus* spp.] for specialized purposes, are site and stand history. Best-quality Ash grows on well drained upland sites in mixture with other hardwoods. Trees subjected to continuous flooding develop a swelled butt which produces light wood of poor strength. Ash growing in moist, fertile soils in stream-valley bottoms produce a wood which is heavy (mainly in the butt), but deficient in stiffness. Wood for handles, oars and sporting goods usually comes from young second-growth trees; wood from old-growth trees is frequently of slower growth, lighter and less strong. Selection of better-quality wood within the log can usually be made on the basis of annual-ring width, provided it is recognized that narrow rings from near the centre of the tree do not necessarily indicate a lack of toughness. In general, 5–17 rings per radial in. are required for best-grade spade handles and agricultural tools. Comparative weights of dry wood are also a good index of quality. In general (with the exception of wood originating in stream-valley bottoms) the heavier the wood the better the quality.

31.28. Working Qualities

2039. **Utilization of secondary timbers.** *Rep. For. Dep. Uganda 1949*, 1950 (24).

Reports on working qualities of *Celtis zenkeri*, *Holoptelea grandis*, and *Schrebera macrantha*.

31.3. *Chemical Properties*

See also *For. Abstr.* 12 (Nos. 2008, 2051, 2053).

2040. LIESER, T., and SCHAACK, W. Zur Kenntnis des Lignins, II. Mitteilung. **[Lignin. II.]** *Chem. Ber.* 83 (1), 1950 (72–7). 7 refs. L.S.

Spruce wood-flour was nitrated with nitrating-acid mixture. No genuine nitro groups could be detected either in nitro-wood, the yield of which was very good, or in nitro-lignin, which had separated from the nitro-wood.

2041. MEREWETHER, J. W. T. **Studies on the lignin of *Eucalyptus regnans*. IV. Alkali lignin.** *Aust. J. sci. Res.* 2*A* (4), 1949 (600–7). 13 refs. P.R.

The data for alkali lignin-A (dioxan-ether-insoluble) are consistent with the empirical formula $C_{86}H_{78}O_{27}$, containing 9 methoxyl, 3 acidic, and 4 alcoholic hydroxyl groups. Alkali lignin-B (dioxan-ether-soluble) was found to be identical with the alkali lignin previously isolated from sulphate black liquor. [Cf. *For. Abstr.* 11 (No. 2023).] *From author's summary.*

2042. SUNDMAN, J. Vedfruktosaner. **[The fructosans in wood.]** *Pap. ja Puu* 32*B* (10), 1950 (306–8). 15 refs. [Sw.e.] [Oy Keskus-laboratorio, Helsinki.] P.R.

An investigation of earlier methods of determining fructosans in wood and cellulose showed that drastic hydrolysis may destroy 50–70% of the fructose, and that there is a risk that fructose will be formed from glucose and mannose during the analysis. A new method, using a milder form of hydrolysis, is described. Investigations using this method showed that no fructosan is present in Spruce, Pine and Birch, or in holocellulose, or rayon and paper pulp from Spruce.

2043. CHAUDHRY, G. R., and SIDDIQUI, S. **Chemical examination of Archa (*Sonneratia acida* L.). Part I: Isolation of three crystalline products from the wood.** *J. sci. industr. Res., India* 9*B* (5), 1950 (118–20). P.R.

Two coloured substances, archin, $C_{15}H_7O_2(OH)_3$, and archinin, $C_{15}H_8O_2(OH)_2$, and a colourless crystalline water-soluble phenolic compound, archicine, $C_{17}H_{14}O_{12}$, have been isolated. *From authors' summary.*

2044. CHASTAIGNET, J. Étude de l'extraction du bois par les solvants organiques. I. Rapports d'essais. **[Studies on the extraction of wood with organic solvents. I. Test reports.]** *Mémorial des Services chimiques de l'État, Paris* 34, 1948 (255–62). [F.] I.C.I.

Presents in tabular form the results of extraction tests carried out with Oak, Poplar, Fir, Spruce and *Pinus maritima* by 5 French Government or other laboratories, using ethanol, benzene, ether, water, dichloromethane, and ethanol/benzene mixture as solvents. Tests of the effect of the form of the wood (chips, sawdust etc.) failed to give definite results. The extraction proceeds at an ever decreasing rate, 8 hours being sufficient in practice to remove the greater part of the extractives. The speed of extraction should not exceed that equivalent to 6 siphonings in 1 hour. The Kumagava extraction apparatus gave a higher quantity of extract than the usual Soxhlet apparatus. Specimens of Oak, Spruce and *Pinus maritima* show the highest % of lignin after extraction with ether, benzene and dichloromethane, and the lowest after treatment with ethanol. The quantity of extract diminishes with increase in storage time of the wood.

2045. ROUDIER, A. Étude de l'extraction du bois par les solvants organiques. II. Étude de la normalisation de l'extraction des bois par les solvants organiques. **[Studies on the extraction of wood with organic solvents. II. Study of the standardization of wood extraction with organic solvents.]** *Mémorial des Services chimiques de l'État, Paris* 34, 1948 (263–72). [F.] I.C.I.

A provisional standard method of extracting wood specimens with organic solvents is suggested.

2046. **Wood chemistry.** *Rep. N.Z. For. Serv. 1949–50*, 1950 (39).

[Cf. *For. Abstr.* 11 (No. 2794).] Ether-soluble determinations were made for wood of *Pinus radiata*, *P. nigra* var. *calabrica*, and *P. contorta* var. *latifolia*. Pith in *P. radiata* may contain as much as 46% (based on oven-dry weight) of ether-soluble resins. The effect

attributable to seasonal change upon ether-soluble resin content of the Corsican and Lodgepole Pines was tested on trees representing 3 crown classes, felled in July (dormant period), in October (2 weeks after height growth commenced), and in November. In Corsican Pine, the commencement of growth was reflected by doubling of the ether-soluble content at the 6-in. and 4-in. diameter levels respectively in dominant and co-dominant trees; later, a comparable increase occurred in the suppressed-tree class, while a slight decrease was recorded in the other two crown classes. In Lodgepole Pine there was no well defined change.

2047. **[The chemistry of New Zealand conifers.]** *Rep. Dep. sci. industr. Res. N.Z.* 1950 (23).

[Cf. *For. Abstr.* 11 (No. 2794); 12 (No. 1190).] In continued studies of *Pinus radiata*, *P. nigra* var. *calabrica* and *P. contorta* var. *latifolia*, pinosylvin and pinosylvin monomethyl ether, both of which retard the sulphite pulping of Pine heartwood, were isolated from *P. radiata*. A new compound, the structure of which was established as 9-keto-ferruginol, was isolated from the neutral resin fraction of *Dacrydium cupressinum*. Another new compound, hydroxy-totaral, was isolated from *Podocarpus totara*.

2048. **Wood as a causal factor in the corrosion of metals.** *Rep. For. Prod. Res. Bd., Lond. 1939–47*, 1950 (24–6). 2 refs.

In some circumstances the rain-water extract from Western Red Cedar (*Thuja plicata*) can cause rapid acceleration of corrosion of zinc or lead used for eaves, gutters, valleys, etc., of shingled roofs. The rain-water extract of *T. plicata* is acidic, and some samples may have a pH as low as 3·0 owing to the presence of tannic and dehydroperillic [cf. *For. Abstr.* 11 (No. 1129)] acids. Laboratory experiments have shown that the acid extract can sometimes dissolve the protective coating which normally develops on zinc and lead exposed to weather and can promote attack on the metal. The attack is rapid at first and is accompanied by considerable evolution of gas. At the same time, however, the acids in the extract are progressively neutralized through interaction with metal to form salts such as tannates, insoluble in water or dilute solutions of the wood extract. When conditions are such that these salts can form a deposit on the metal the corrosion is arrested or its rate reduced. When, however, the metal is steeply inclined, the metallic salts tend to be washed away as soon as they are formed, and corrosion in such places is progressive, although there is evidence that the acidity of the rain-water extract decreases in time. It is advisable to protect susceptible areas of metals in shingle roofs by a bituminous or other suitable paint.

Most common woods impart acidity to water with which they are moistened. Of over 60 species examined, only 2—Quipo (*Cavanillesia platanifolia*) and Balsa (*Ochroma lagopus*)—rendered water alkaline, giving pH values up to 10·26 and 8·00 respectively. At ordinary room temperatures, corrosion is slow at a pH above 10, rather more rapid between 10 and 4·3, and rapid at a pH less than 4·3. Samples of 20 species examined have been found to give a pH of 4·5 or less; these include Oak, Chestnut, *Eucalyptus* (5 spp.), Spruce, Pine, Larch, Douglas Fir and Western Red Cedar. [Cf. *For. Abstr.* 9 (No. 313).]

31.4. *Durability. Decomposition*

See also *For. Abstr.* 12 (No. 2175).

31.41. Natural Durability

2049. **Durability tests.** *Rep. For. Dep. Uganda 1949*, 1950 (23–4).

Reports on long-term tests in the Budongo and Namanve graveyards, on *Podocarpus milanjianus*, *P. gracilior*, *Afzelia africana*, *Albizzia coriaria*, *A. zygia*, *Butyrospermum parkii*, *Cordyla richardii*, *Erythrophleum guineense*, *Morus lactea*, *Dalbergia melanoxylon*, *Terminalia velutina*, *Pygeum africanum*, *Entandrophragma angolense*, *Maesopsis eminii*, *Aningueria altissima*, *Canarium schweinfurthii*, *Celtis durandii*, *C. kraussiana*, *C. soyauxii*, *C. zenkeri*, *Holoptelea grandis*, *Mitragyna stipulosa*, *Lovoa brownii*, *Piptadenia africana*, and *Schrebera macrantha*. The species surviving best were *A. coriaria*, *A. zygia*, *C. zenkeri*, *L. brownii*, *P. africana*, and *S. macrantha*. Heartwood of mileposts of *Manilkara cuneifolia* put in the ground 35 years ago is still sound, but the sapwood is badly decayed. Pier piles of this species at Sango Bay, driven before 1914 are all badly damaged; others inserted in 1937 are still sound.

31.42. Attack by Plant Organisms

See also *For. Abstr.* 12
(Nos. 1863, 2162, 2181–2).

2050. SHORE, B. C. G. **Fungal decay of timber.** *Parthenon, London* 23 (9), 1949 (166–70). D.S.I.R.

Paper read at the general meeting of the London and Home Counties Branch of the Incorp. Ass. of Architects and Surveyors (London, 23 March, 1949). Followed by discussion.

2051. GOTTLIEB, S., DAY, W. C., and PELCZAR, M. J. JR. **The biological degradation of lignin. II. The adaptation of white-rot fungi to growth on lignin media.** *Phytopathology* 40 (10), 1950 (926–35). 15 refs.

Poria subacida and *Polyporus abietinus* were only able to grow on lignin in synthetic media after a process of adaptation in which the strains were grown on media containing mixtures of lignin and glucose, the amounts of glucose being gradually decreased until the fungus was growing on lignin alone. Such a process of adaptation also conditions the organism to growth on many different kinds of lignin and lignin-containing residues. Three different strains of *Polyporus versicolor*, however, did not require previous adaptation in order to grow on synthetic, liquid and solid media containing isolated native lignin as the limiting carbon source. All 3 species when grown on media containing mixtures of glucose and lignins made much greater growth than comparable cultures on lignin or glucose alone. [Cf. *For. Abstr.* 12 (No. 1199).]

2052. RICHARDS, D. B. **Decay resistance and physical properties of wood.** *J. For.* 48 (9), 1950 (420–2). 15 refs.

Pieces of the sapwood of Loblolly Pine and Red Gum [*Liquidambar styraciflua*] were subjected to decay by pure cultures of white- and brown-rot organisms. Samples were removed at 2-week intervals up to 14 weeks, and the weight loss due to decay was calculated as a % of the original oven-dry weight. For the conditions of this experiment, neither position within the sapwood of the log nor original specific gravity had any consistent effect on the decay resistance of the wood.

2053. **Resistance to decay of timber.** *Rep. For. Prod. Res. Bd., Lond. 1939–47*, 1950 (26).

The toxicity of a distillate from the alcohol extract from Wallaba (*Eperua falcata*) has been tested and found to be approximately equal to that of pure phenol. This is no doubt partly responsible for the timber's high resistance to decay.

2054. **Effect of fungal decay on the strength of wood.** *Rep. For. Prod. Res. Bd., Lond. 1939–47*, 1950 (27).

It was found that reduction of tensile strength in Beech was twice as great in the early stages of brown rot as in those of white rot.

2055. SAVIRON, P. Sobre un caso de defecto de fraguado del Cemento Portland debido a la madera del encofrado, atacada por un hongo. [**A case of imperfect setting of Portland cement due to the casing wood being attacked by a fungus.**] *Revista de la Academia de Ciencias Exactas, Físico-Químicas y Naturales de Zaragoza* (*Ser.* 2) 1, 1946 (45–8). [Span.] I.I.E.

Chemical reactions set up in the wood by *Merulius lacrymans* affected the composition of the concrete.

2056. SCHULZE, B. Zur Kenntnis der gelbrandigen Hausschwammes *Merulius pinastri* (Fries) Burt 1917. [**Notes on *Merulius pinastri*.**] *NachrBl. dtsch. PflSchDienst.* 28 (10/11–12), 1948 (187–9; 213–6). 11 refs. [G.] [Materialprüfungsamt Berlin-Dahlem.]

Describes the occurrence in various localities in Berlin of a wood-rotting fungus identified as *Merulius pinastri*.

2057. CAMPBELL, W. A., MILLER, J. H., and THOMPSON, G. E. **Notes on some wood-decaying fungi of Georgia.** *Plant Dis. Reptr.* 34 (5), 1950 (128–34).

A list of fungi found in the herbarium of the Department of Plant Pathology of the University of Georgia.

31.43. Attack by Animal Organisms

See also *For. Abstr.* 12
(Nos. 1856–8, 1861–3, 2182–9).

2058. BECKER, G. Bestimmung von Insektenfrasschäden an Nadelholz. [**Identification of damage by wood-eating insects in coniferous wood.**] *Z. angew. Ent.* 31 (2), 1949 (275–303). 40 refs. [G.g.] [Materialprüfungsamt Berlin-Dahlem.]

Descriptions, photographs and drawings are given for the identification of galleries of some 50 species of wood-boring insects found in conifers. Marks of identification include shape and size of the flight holes; the general arrangement of the galleries; cross section, size, colour and contents of the galleries; shape, colour and size of the frass; and the age and condition of the wood.

2059. **Timber preservation: entomological investigations.** *Rep. Dep. sci. industr. Res. N.Z.* 1950 (68).

There is a wide variation, from two to several hundred, in the number of eggs laid by *Anobium punctatum* on different wood blocks in identical conditions. Variation occurs with all timber species, is not due to presence or absence of egg-laying sites, and is not influenced by the removal of ether or water extractives *Anobium* larvae have been shown to digest 20–25% of the wood eaten; little or no pentose fraction is digested Marked differences in larval growth rate of *Ambeodontus tristis* were found to occur in different wood species, and some evidence was obtained that the rate of growth was related to N content of the wood.

2060. Käferfrass in Bau (Teil 1). **[Damage by beetles in buildings. Part 1.]** *Holz-Helfer, Suppl.* to *Holz* 4 (9), 1950. pp. 2. [G.] P.R.

Descriptions of *Hylotrupes bajulus, Callidium violaceum,* and *Ergates faber,* and of preventives.

2061. **Forest entomology.** *Rep. For. Res. W. Bengal 1947–8,* 1949 (6).

Specimens of wood of *Cryptomeria japonica, Cedrela toona, Sterculia villosa, Bombax malabaricum,* and *Adina cordifolia* were subjected to a graveyard test at Sukna in the Kurseong foot-hills, to determine their vulnerability to termite attack. *C. japonica* was attacked by the end of the first week, and the other species were also attacked in the course of the next 3 weeks, in spite of heavy rains. It would appear that different species of termite have different tastes, for poles of *Cryptomeria* used as fence posts in 1940 at an altitude of 5,000 ft. in the Kalimpong hills, proved practically immune to attack by the species of termite common in that region.

2062. **Five post species resist termites two years.** *Carib. For.* 11 (2), 1950 (79–80, 103–4). [E.Span.] (*Rep. U.S. trop. For. Exp. Sta.* 10, [1949?].)

Durability tests of 32 species for fence posts showed that only 5 species resisted termite attack over a space of 2 years. These were:— *Thouinia striata, Tetrazygia eleagnoides, Citharexylum fruticosum, Chrysophyllum pauciflorum* and Jaboncillo [?].

2063. HARRIS, W. V. **Dry-wood termites.** *E. Afr. agric. J.* 16 (1), 1950 (50–2).

The native Kalotermitidae of East Africa, which are restricted to dead branches and stumps, are *Kalotermes durbanensis, Procryptotermes jeannelanus, Neotermes cryptops, N. meruensis, N. firmus* and *Glyptotermes parvulus.* The economically more important, imported species, which infest timber in buildings, are *Cryptotermes havilandi* and *C. dudleyi. C. brevis* has become established in the cities and neighbourhoods of Durban and Port Elizabeth, but has not yet spread to other parts of the Union or to the East African colonies.

31.8. *Quality and Defects of Timber*

See also *For. Abstr.* 12 (Nos. 2038, 2100, 2122).

2064. LOCKARD, C. R., PUTNAM, J. A., and CARPENTER, R. D. **Log defects in southern hardwoods.** *Agric. Handb. U.S. Dep. Agric.* No. 4, 1950. pp. 37.

With over 50 photographs.

32. HARVESTING OF WOOD. LOGGING

2065. EDLIN, H. L. **A tree-feller's glossary.** *Wood* 15 (10), 1950 (372–4).

Drawn mainly from English and Scottish sources and covering timber transport as well as felling.

2066. CHARD, R. **Felling and extraction in Britain.** *Wood* 15 (10), 1950 (360–3).

2067. BALE, A. P. **Modern forestry equipment.** *Wood* 15 (10), 1950 (375–9).

Describes with illustrations some power felling saws, cable-logging systems, lorries, cranes, etc.

2068. SUSMEL, L. Utilizzazione forestale in Cadore. **[Forest exploitation in Cadore**

[Carnic Alps].] *Ital. for. mont.* 5 (6), 1950 (233–7). [It.]

Describes logging tools, and methods of felling, branching, skidding, etc.

2069. BROWN, N. C. **The mechanization of the logging industry in Canada and the United States.** *Wood* 15 (10), 1950 (354–9). [New York State College of Forestry.]

2070. HEMMINGSEN, J. O. **Mechanical logging developments in Newfoundland.** *Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1067 (*B*–1), 1950. pp. 7.

2071. SWABEY, C. **Timber handling in British Guiana.** *Wood* 15 (10), 1950 (370–1).

2072. HAHN, J. L. **Trends in 'exotic' forest utilization and logging in New Zealand.** *Aust. Timb. J.* 16 (5), 1950 (348, 350, 353–6).

Describes the methods, safety equipment and tools used in logging *Pinus radiata*.

2073. VÖRY, J. Metsätöiden rationalisoinnin keinoista ja merkityksestä. **[On the methods employed in and the importance of rationalization of forest work.]** *Julk., Metsäteho, Helsinki* No. 22, 1949 (8–11). [Fi.e.]

Emphasizes the need for increased mechanization.

2074. MILLER, C. I. **Work simplification in woods work.** *Sth. Lumberm.* 181 (2267), 1950 (37–42).

Discusses, with examples, methods of analysing logging operations to eliminate unnecessary processes and labour.

2075. DUFF, C. H. **Test of camp heating stoves.** *Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1085 (*B*–3), 1950. pp. 3.

Describes and discusses the performance (shown in tables) of 3 wood-burning stoves tried out in logging camps.

32.2. *Felling and Related Operations*

See also *For. Abstr.* 12 (Nos. 2377, 2458, 2460).

2076. BOUSQUET, V. W. **Prelogging the understory.** *Wood, Chicago* 5 (9), 1950 (26 42, 44). P.R.

Describes methods employed by the Weyerhaeuser Timber Co. for the removal, before anything else is logged, of the smaller elements of understorey which are usually destroyed when the bigger trees are removed. [Cf. *For. Abstr.* 10 (No. 2655).]

2077. TUOVINEN, A., and LESKINEN, S. Aikatutkimuksia pinopuutavaran valmistuksesta Pohjois-Suomessa. **[Time studies on the cutting of cordwood in North Finland.]** *Julk., Metsäteho, Helsinki* No. 19, 1948. pp. 50. 6 refs. [Fi.e.]

Data obtained suggest that branchiness increases the time taken in cordwood production more than the presence of unsound trees, and that the working time in North Finland exceeds that in South Finland. [Cf. *For. Abstr.* 12 (No. 416).]

2078. **Explosive wedge used in Pennsylvania operation.** *Lumberm.* 77 (10), 1950 (111).

A special wedge with a hold for a fuse in the side and a hollow powder chamber is used by the Armstrong Forest Co., Johnsonburg, Penn. Its construction and use are described. It will split meterial of diameters of more than 12 in. into 2–4 pieces. To encourage splitting into 4 pieces, a wedge has been designed with the small end hollowed out for a square rather than a circular opening for the powder chamber. In a normal operation, 80 kegs of 3 F black powder weighing 25 lb. each, lasted about 5 weeks and split 900 cords of large bolts, mostly Beech and Maple; estimated cost was *ca.* 2 cents per shot. Only 2 accidents caused by the use of explosive wedges were recorded in splitting nearly 25,000 cords of 52-in. material.

2079. KOOLS, J. F. Onderhoud van zagen met driehoekstanden. **[Maintenance of cross-cut saws with triangular teeth.]** *Ned. Boschb.-Tijdschr.* 22 (1), 1950 (289–97). [Du.du.e.]

2080. **Hansel ring barker.** *Lumberm.* 77 (8), 1950 (83–4, 97).

A ring-type hydraulic barker manufactured by the Hansel Engineering Co., of Vancouver, B.C., and in use in several mills in Oregon, Idaho, and British Columbia, is described. The machine consists of a rotor which carries the nozzles and which rotates between seals in a stationary member to which the water is supplied under high pressure. The rotor is driven by multiple V-link belts from an electric motor operating through a hydraulic coupling. This assembly is mounted in a cradle so that

the bore may be raised or lowered or moved horizontally in either direction to deal with unevenesses in the logs under treatment. The article is illustrated with photographs.

2081. HILLBOM, T. Barkning av småvirke och andre massavedstyper. **[Barking of small wood and other types of pulpwood.]** *Svensk PappTidn.* 53 (17), 1950 (522–4). [Sw.e.g.] P.R.

Three types of barking machine, the barking drum, the Thorne friction barker and the open friction barker, are described with illustrations, and results of experiments on their use for small-diameter timbers are discussed. Photographs are given showing thick-barked dry Birch, and thin-barked incompletely saturated Spruce before and after barking. A load of about 20 cu.m., loose piled, and in 3-m. lengths took about 30 minutes to bark sufficiently for use as sulphate wood; proper saturation or heating before treatment would have reduced the time. The drum barker will only handle fairly thick wood, but can be used for pieces of unequal length and crooked pieces. The open friction barker is best for small-diameter wood, but lengths must be even (not less than 3 m.) and the pieces fairly straight.

2082. DE MOISY, R. G. **Canadian tree poisoning method facilitates bark removal for U.S. firm.** *B.C. Lumberm.* 34 (8), 1950 (68, 70).

Describes examples from commercial practice of girdling and poisoning with sodium arsenite. [Cf. *For. Abstr.* 11 (No. 1926).]

2083. FENTON, R. H. **A pilot study of the use of light portable wood chippers.** *Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1082 (*B*–11), 1950. pp. 6. *Repr.* from *Pulp Paper Mag. Can.* 51 (7), 1950 (132–3, 136). [North Eastern Forest Experiment Station.]

In a test of the effect of different variables on the production rate, changes in knife setting were found to be significant. The production of chips from mixed hardwoods, using a setting of $\frac{3}{32}$ in., averaged 202 cu. ft. or 1·7 tons/hr.; from one of $\frac{1}{8}$ in., 279 cu. ft. or 2·5 tons/hr. Small samples of Red Maple and mixed Oak yielded 237 and 235 cu. ft./hr. respectively. With the small chipper used (a C–6 model, which with trailer and engine weighed *ca.* 1 ton), better yields were obtained from material 2 and 3 in. in diameter than from 1- and 4-in. material. The effect of length was a reflection of the operators' physical limitations, 10- to 15-ft. lengths appeared to be the most convenient to handle. Type of knife (serrated or straight) had apparently little effect on rate of production. A crew of 2 seemed enough to ensure fairly constant and high production. Careful piling of material to be handled is important. Total chip cost, in trucks, is estimated to range from $3.86 to $5.94/ton. [Cf. *For. Abstr.* 12 (Nos. 424–5).]

2084. MCLAREN, C. G., and BURGY, M. P. **Portable chippers in woods operation.** *Timber of Canada* 51 (11), 1950 (140, 143).

Describes in detail a portable pulpwood chipper developed by the National Container Corporation of Wisconsin.

32.8. *Grading and Storage of Wood in the Rough*

See also *For. Abstr.* 12 (Nos. 2038, 2064, 2182, 2186–7).

2085. **Grading rules for Redwood logs.** *Timberman* 51 (10), 1950 (64).

Established by the Holmes Eureka Lumber Co., Eureka, Calif.

2086. ROARK, C. **Store veneer logs in farm ponds.** *Soil. Conserv.* 16 (1), 1950 (2, 16).

Logs ponded in a veneer-cutting plant in S. Carolina have kept satisfactorily for as long as 18 years. The pond is constructed to permit the lowering and raising of water quickly to facilitate storage and withdrawal.

32.9. *Transport*

32.91. Land Transport

2087. WEBB, B. E. **Logging by tractors.** *Malay. Forester* 13 (3), 1950 (148–50).

An experiment has been made by the Malay Forest Department, to ascertain the feasibility of logging by tractor and to determine the cost. The area chosen was mixed forest with some really large trees; the steepest gradient was 1 in 3·3 with the load, 1 in 7·1 against the load. The machines used were Caterpillar D-6 tractors with standard-gauge tracks and grouser plates, fitted with La Plante Choate R-61 angle-dozers, D-6N Hyster towing winches with 350 ft. of 1-in. steel cable, Hyster patent slings

and chokes fitted to $\frac{7}{8}$-in. cable, and locally made M.S. skidding pans weighing about 800 lb. The average load per trip was 110 cu. ft. and the average load hauled per tractor per day was 350 cu. ft. Costs for the experiment amounted to S.S.$12.42 per tractor hour to S.S.$10.26 per ton of 50 cu. ft., but these could be considerably reduced. Felling and cross-cutting cost S.S.$4.50 ton over and above the tractor costs. The sawmill had previously been paying S.S.$20 ton for felling and logging by buffalo, but the men had decamped after clearing the lowest $\frac{1}{4}$ mile of the forest, so that it would have cost a great deal more to have got the top of the area logged. It is clear that it would amply repay mills to purchase such tractors. The machines proved well up to the work. Winches and angledozers are essential, and it is considered that guide rollers on the winches would make winching easier. Other improvements would be wide-gauge tracks to give greater stability on side slopes, and wide grousers to give more holding power when winching. The maximum economic distance for skidding in hilly country of this nature is about $1\frac{1}{4}$ miles, after which it would be necessary either to build a road or bunch the logs for hauling on some form of heavy trailer such as a Hyster logging arch. [Cf. *For. Abstr.* 11 (No. 2864).]

2088. WALKER, E. S. **Three-axle 'weapon carriers' in South Perak.** *Malay. Forester* 13 (3), 1950 (143–7 + 2 photos). 2 refs.

Describes the use of army-surplus Dodge 29·4-h.p., petrol-driven lorries, available in Malaya in 1948 for S.S.$690/- each. They have independent drive on 3 axles, and are also provided with a winch at the front which can be used both for loading logs (and, if necessary, skidding them for 150–200 ft.) and for dragging out the loaded vehicle when a snag or a short, steep grade proves too difficult to surmount normally. To adapt the chassis for 16- to 20-ft. logs, it is lengthened about 2 ft. by welding, and the two driving shafts are similarly lengthened. The total cost of alteration is *ca.* $150. The two rear axles are fitted with extra wheels and tyres of 9 × 18 in. When the double wheel is fitted on each rear axle, each pair bears on a surface some 18 in. wide; thus the load is spread over a very broad and widely distributed surface, and the tyres have a tremendous grip on the ground. Observations made so far, indicate that the use of such vehicles for extraction, provided that as many tracks as possible are used, is rather beneficial than otherwise to natural regeneration. The use of a large number of tracks is also desirable from the point of view of soil conservation.

Where mechanical extraction is envisaged, it is suggested that a single seeding felling is the most that is needed, and even that might be dispensed with if milliacre survey showed adequate recruitment. The first operation, after the pole fellings, might be a heavy seeding felling aimed at the removal of trees not considered essential for seeding the area. Gaps in the canopy of more than 1 or 2 chains should be avoided. The more churning up of the ground there is in this first operation, the better the crop of seedlings likely to be produced. [Cf. *For. Abstr.* 11 (No. 2864).]

2089. LESKINEN, S. Auto ja telaketjuauto puutavaran kuljetuksessa Posiolla. [**Lorries and track vehicles in timber transport at Posio.**] *Metsät. Aikak.* 1950 (1), (27–9). [Fi.e.]

A local study, comparing the cost and effectiveness of different methods of (winter) transport.

2090. HEISKANEN, V. Pinotavaran autokuljetuksesta. [**Lorry transport of stacked wood.**] *Julk., Metsäteho, Helsinki* No. 22, 1949 (22–30). [Fi.e.]

Discusses problems of and equipment for hauling, loading and unloading.

2091. PUTKISTO, K. Puutavaran hevoskuljetuksesta: suurkuormien kuljetuksen edellytyksistä. [**Haulage of timber by horses: prerequisites for transporting big loads.**] *Julk., Metsäteho, Helsinki* No. 22, 1949 (38–47). 8 refs. [Fi.e.]

Discusses with graphs, tables and illustrations, the more important factors involved, including the draught capacity of the horse, the quality of the road, the air temperature, type of sledge and loading technique.

32.92-4. Water Transport

2092. TUOVINEN, A. Puutavaran rantavarastojen talviniputuksesta. [**Bundling of timber in winter at bank storage sites.**] *Julk., Metsäteho, Helsinki* No. 24, 1950. pp. 105. [Fi.e.]

The following methods are discussed: (1) Hauling wood from the bank on to the ice by double sleighs, and piling on the ice into bundling cradles. This method is slow, with an output of 16·0 cu.m./man/working day, but bundles of any size can be made, and equipment is cheap. (2) Bundling wood at bank storage site and hauling bundles on to the ice by winch sleigh. An output of 28·5 cu.m./man/day was obtained, with the size of bundles used so far, 5 cu.m. (3) Bundling wood at bank storage site and hauling by the bundlers on to the ice. When the same working group handled both bundling and hauling, the output was 19·1 cu.m.; with separate groups 21·8 cu.m. (4) Unloading tractor-sleigh loads in bundles on to the ice. (5) Carriage along skids or rails on to the ice. Neither (4) nor (5) has been tried in Finland. Factors affecting these methods are: size of bundles, quality of equipment, sinking, and climatic factors (depth and quality of snow, and thickness of the ice). Probable developments of the methods are considered. The article is illustrated with photographs and diagrams, and there are graphs and tables, all with captions in both Finnish and English.

2093. TUOVINEN, A. Talviniputuksesta. **[On winter bundling.]** *Metsät. Aikak.* 1950 (1), (16–9, 24). [Fi.e.]

Winter bundling, which is done on a big scale in the U.S.S.R. and to some extent in Sweden, is being practised increasingly in Finland at the expense of summer bundling. For 2-m. lengths the cumbersome method of hauling from bank storage site on to the ice and then bundling, is being abandoned in favour of direct haulage from the forest. Bundles made up in cradles are mounted on skids at the bank site and hauled on to the ice by a winch-sleigh; or, to an increasing extent, bundler-sleighs are doing both jobs. For long timber, experience with these new methods is still meagre. Alternatives are (1) to winch-haul it on skids to a bundling installation on the ice, as commonly done in the U.S.S.R.; (2) to unload the timber directly on to foundation logs set on the ice and then bundle it; or possibly best of all (3) to form the bundle on a lorry and tip it off laterally by a ramp, a method also of promise for unloading tractor sleighs. The various methods are illustrated. [Cf. *For. Abstr.* 10 (No. 1966).]

2094. TUOVINEN, A. Tutkimus maalle nostettujen rampapuiden uitosta Kemijoella. **[Investigation into the floating on River Kemijoki of waterlogged timber lifted ashore.]** *Julk., Metsäteho, Helsinki* No. 20, 1949. pp. 54. [Fi.e.]

Results of re-floating tests on waterlogged timber are tabulated. Quantities reaching their destination ranged from over 40% for 2-m. pulpwood to *ca.* 65% for 2-m. dead trees. Floating loss for Spruce was less than for Pine. Small-scale tests suggest that buoyancy is much improved by barking and by impregnating both ends of the logs. [Cf. *For. Abstr.* 11 (No. 1947).]

2095. HEISKANEN, V. Proomausten rationalisointi Päijänteellä. **[Rationalization of lighter transport on Lake Päijänne.]** *Julk., Metsäteho, Helsinki* No. 22, 1949 (31–7). [Fi.e.]

32.95. Ropeways. Cableways

2096. COLLIER, R. D. **Gravity transport of wood by wire.** *Pulp Paper Mag. Can.* 51 (7), 1950 (138, 142). *Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1087 (*B*–8–*g*).

Cf. *For. Abstr.* 12 (No. 439).

2097. VENET, J. La mécanisation des exploitations forestières vosgiennes. **[The mechanization of forest extraction work in the Vosges.]** *Rev. for. franç.* No. 10, 1950 (570–7). 5 refs. [F.]

An account of the use of cableways (Wyssen, Lasso-câble, and Tricable) for the extraction of timber.

2098. KIRKPATRICK, R. E. **Power calculations for chain and cable pulpwood conveyors.** *Timber of Canada* 51 (11), 1950 (130, 133–5, 137).

Various widely used formulae are reviewed, and a new formula in the form of a nomogram is presented.

33. CONVERSION AND PRESERVATION OF WOOD

33.1. *Mechanical Conversion excluding the Manufacture of Mechanical Pulp*

2099. [WISE, S. A.] **Lumber productivity in U.S.A.** *Timber Tr. J.* 195 (3872), 1950 (379–81).

Discusses briefly the study of the U.S.A. timber industry made by the O.E.E.C. technical aid mission, stresses the advantages of board-foot measurement and of standardizing timber sizes, and describes some of the yards and mills visited.

2100. NAIR, K. R. **On the application of statistical quality control methods in wood based industries.** *Indian For.* 74 (11), 1948 [1950] (379–83).

Discusses the variables suitable for statistical treatment in quality control in e.g. the timber and plywood industries.

2101. HORDERN, R. H. **Technical factors in high production woodworking.** *Wood* 15 (11), 1950 (430–2).

Discusses the selection of machinery, the lay-out of the plant, selection and training of workmen, and the continuity of work and supplies.

2102. HAYCOCK, A. H. **Conversion and machine woodworking. 1. High production conversion. 2. High output woodworking.** *Wood* 15 (11), 1950 (416–25).

2103. BENSON, C. A. **Safety in lumber handling.** *Timberman* 51 (11), 1950 (44–6, 56).

Safety installations and practices in dry kilns, mills and transport sheds in a branch of the Weyerhaueser Timber Co. are described.

Use of Wastes

See also *For. Abstr.* 12 (Nos. 1945, 2145, 2148–50).

2104. RISI, J. Conservation par l'utilisation des déchets de bois. **[Conservation through the utilization of wood-waste.]** *For. et Conserv.* 2 (7; 8), 1950 (817–23; 857–73). 145 refs. [F.]

A review of recent advances.

33.12. Joinery, Furniture and Cabinet Making, Wood Bending

2105. KÖSE, S. Bizde küçük el sanatları. **[Handicrafts in our country.]** *Orman ve Av* 19 (9), 1947 (180–6). [Turk.]

Describes in some detail, with illustrations, the main products—from spindles and bobbins to domestic utensils and containers—and the species used for each.

2106. HORDERN, R. H. **The economics of woodworking—4. Machines used in woodwork contruction; Costing the product; 5. Estimating.** *Wood* 15 (6; 7; 8), 1950 (214–6; 237–8; 275–6).

Cf. *For. Abstr.* 12 (Nos. 453, 491).

2107. HAYCOCK, A. H. **Principles of machine woodworking. Jointing cutters (3). Pre-formed cutters.** *Wood* 15 (9–10), 1950 (326–9; 382–4).

2108. HYLER, J. E. **Some salient features of vertical gang boring machines.** *Wood Prod.* 55 (9; 10), 1950 (16–8; 23–5).

2109. **High speed equipment [for moulding, boring and sanding.]** *Wood* 15 (11), 1950 (433–4).

2110. HEID, F. J. **Moulder spindle speeds as related to output and quality of work produced.** *Sth. Lumberm.* 181 (2269), 1950 (70, 72).

2111. DRUMMOND, S. **The automatic square chisel mortiser.** *Timber News* 58 (2136), 1950 (417–8).

2112. **Wood bending.** *Rep. For. Prod. Res. Bd., Lond. 1939–47*, 1950 (61–2).

Data relating to the limiting radius of curvature of Canadian and Finnish 3-ply have been obtained. Methods of producing bends of small radius, as required for the manufacture of radio cabinets, have been studied and some new methods evolved. A new method of producing laminated hoops by bending concentrically a number of prepared laminae has been developed. The laminae must be cut accurately to length but the method is otherwise simple, needs little equipment and is suitable for industry.

In tests of small consignments, *Diospyros crassiflora* was found to have good, and *Afzelia bipindensis* very poor, bending properties. Rock Elm (*Ulmus thomasi*) and White Elm (*Ulmus americana*) have been shown to possess excellent bending properties, only slightly inferior to those of *Ulmus hollandica* var. *major*. There did not appear to be any significant difference in the limiting radii of the two Elms, irrespective of density. The White Elm, however, particularly if of low density, tended to come distorted during bending and drying out. The findings suggest that high-density Rock Elm is to be preferred.

The possibilities of softening and setting wood by means of radio-frequency heating have been investigated, and it was found that 1½-in. Beech squares at a high moisture content could be made suitable for bending after heating for two minutes. Such pieces, after bending, could generally be 'set' satisfactorily after a treatment of 10 minutes; forms and straps could, therefore, be released in a much shorter time than is usual at present. Further work is needed on refractory species such as Oak before the value of the method can be fully assessed.

A method for producing bends for spade handles by slotting and introducing glued inserts has been developed.

2113. STEVENS, W. C., and TURNER, N. **A method of making laminated hoops and other continuous shapes.** *Wood* 15 (8), 1950 (279–81). [Forest Products Research Laboratory, Princes Risborough.]

The method evolved at Princes Risborough obviates the use of elaborate equipment. A number of thin wooden rings, in which the length of each lamina is carefully calculated, are glued, bent, and pressed to the required shape. Scarf joints are made on the extreme inner and outer laminae only. Before the final bending process one end of each lamina must be made to fit roughly the shape of the form, and pre-bending in a jig is usually necessary. Satisfactory bending of the whole assembly can be effected by using a wooden form, a metal tension strap and a few cramps. At the laboratory a base plate was used, to which was attached an air cramp with a roller fitted to the plunger. The form was secured to a table, which could be revolved by hand. The apparatus was found suitable for making bends (both concentric and eccentric) of 8 laminae, each 2 in. deep and up to ⅛ in. thick.

33.13. Cooperage. Shingles

See also *For. Abstr.* 12 (No. 2105).

2114. REGNELL, S. **Wood-stave pipes.** *Handl. K. tekn. Högsk.* 33, 1950. pp. 158. 101 refs. [E.e.] Price *Kr.*10. P.R.

Includes sections on strength, operating conditions, economic factors and modern wood-stave pipes. Appendices deal with the design of wood-stave pipes carried on supports, stress measurements from four different places, and the theoretical study of freezing of wood-stave pipes. [Cf. *For. Abstr.* 11 (No. 2916).]

33.15. Manufacture and Use of Veneers and Laminated Wood. Improved Woods. Laminated Materials other than Wood. Glues and Gluing

See also *For. Abstr.* 12 (No. 1996).

33.15.1. *Manufacture of Veneers and Laminated Wood*

See also *For. Abstr.* 12 (Nos. 2126, 2129–30, 2136).

2115. BENE, J. **Douglas Fir substitutes for the British Columbia plywood industry.** *B.C. Lumberm.* 34 (8), 1950 (49–50, 145).

This paper, read at the Fourth Annual National Meeting of the U.S. Forest Products Research Society, 1950, discusses the possibility of using Hemlock and Cedar and other conifers, tropical hardwoods, and, in more detail, some West Coast hardwoods (*Populus trichocarpa*, *Betula papyrifera* var. *occidentalis*, *Acer macrophyllum* and *Alnus rubra*) for plywood. The importance of hardwoods in the veneer industry is emphasized.

2116. REINMUTH, P. **The manufacturing of Western Pine veneer.** *Sth. Lumberm.* 181 (2267), 1950 (48, 50, 52, 56, 58).

2117. **Veneer slicing machines.** *Sth. Lumberm.* 181 (2266), 1950 (62).

2118. HYLER, J. E. **Veneer drying.** *Sth. Lumberm.* 180 (2252; 2254), 1950 (65–6, 68, 70; 45–6, 48).

2119. HYLER, J. E. **Joining veneers together edgewise.** *Sth. Lumberm.* 180 (2260), 1950 (61–2); 181 (2262; 2264–5), 1950 (59–60; 53–4, 56; 57–60).

2120. **Notes on the manufacture of flat plywood.** *Sth. Lumberm.* 181 (2268), 1950 (68, 70, 72, 74). 7 refs.

A description of suitable methods based on factory experience and on experiments at Madison.

33.15.2. *Use and Properties of Plywood and other Laminated Wood*

See also *For. Abstr.* 12 (Nos. 2112–3, 2217–8, 2274–6).

2121. **Plywood plates: frequency of vibration and static deflection.** *Rep. For. Prod. Res. Bd., Lond. 1939–47*, 1950 (22–3).

(1) *Frequency of vibration*—The following preliminary results have been obtained: (*a*) In the case of plates with the face grain parallel and perpendicular to the sides (0°–90° plates), the observed frequency with edges clamped is 20° lower, and with edges supported *ca.* 20° higher than the calculated frequency. (*b*) Grain angle has very little effect on frequency of vibration and central deflection of square plates; this cannot be expected to hold good for oblong plates. (2) *Static deflection*—Comparisons of observed and calculated deflections under static load for 0°–90° plates with supported edges show reasonable agreement, but the plates deflect somewhat less than theory predicts.

2122. **[The surface splitting of plywood.]** *Rep. For. Prod. Res. Bd., Lond. 1939–47*, 1950 (70).

Experiments over 5 years to determine the influence of veneer thickness on the surface splitting of plywood exposed to weather and indoors, have shown that even indoors splitting is likely to occur if the thickness of the surface veneer much exceeds 0·06 in.; outdoors, the exposed veneer invariably splits, but if its thickness is *ca.* 0·02 or 0·025 in., the defect is visible only on close examination. The thickness of the cross-bands and other veneers in the core appears to be without influence on the splitting. Some species are more liable to splitting than others, softwoods showing the most and light hardwoods the least.

33.15.3. *Improved Woods*

See also *For. Abstr.* 12 (No. 2221).

2123. TAMBLYN, N. [Compiler]. **[Bibliography of] manufacture and utilization of 'improved wood'.** *Bibliogr. Ser. For. Prod. Aust.* No. 40, 1950. pp. 6. 72 refs.

2124. **Rosin-wax impregnated wood.** *Rep. For. Prod. Res. Bd., Lond. 1939–47*, 1950 (40–4).

Cf. *For. Abstr.* 8 (No. 2518).

2125. VOGEL, F. H. **Impregnation of wood with solid metal alloys.** *Sth. Lumberm.* 181 (2268), 1950 (48, 50). [Alabama Polytechnic Institute, Auburn, Alabama.]

Small blocks of *Liquidambar styraciflua*, *Fraxinus americana*, *Quercus laurifolia*, *Q. lyrata*, *Nyssa aquatica*, and *Taxodium distichum*, were first heated in a bath of molten metal alloy at 210° C. and then impregnated under a pressure of 50 lb./sq. in. for 3 minutes at 200°. Retentions varied between different species and between heartwood and sapwood. Hardness was increased significantly in the softer, lighter species. Dimensional stability and conductivity of heat and electricity were increased. Metal-impregnated wood, even at the highest retentions of metal, retained some, though a greatly reduced, capacity for absorption of water and oil solutions. Gluing behaviour in preliminary experiments was generally similar to that of untreated wood, but a primer was needed when a heavily impregnated zone was exposed.

2126. **Pressurizing Black Gum.** *Lumberm.* 77 (8), 1950 (66).

The uneven drying rate of Black Gum [*Nyssa sylvatica*] is attributed to the presence of acids in the wood. In this process, a solution consisting of corn sugar molasses, a commercial solution called No. 41BE Hydros and a Cu or Cr metal powder is forced into the end of the log at 40 lb. pressure, to replace the acids in the wood. A rubber cap is fitted tightly over the end to retain the pressure, and apart from a very slight leakage at knots, the bark holds the pressure in the log. At the opposite end, the acid drips out into a bucket, and a 40% recovery of the solution is obtained. The metal powder coats the cell walls, making the wood more water-repellent and decay-resistant. The wood is denser than before treatment. A larger proportion of split-free smooth veneer is obtained by this method, and warping of the veneer after drying is reduced.

33.15.5. *Glues and Gluing*

2127. TROOP, B. S., and WANGAARD, F. F. **The gluing properties of certain tropical American woods.** *Tech. Rep. Yale Sch. For.* No. 4, 1950. pp. 10 + 3 gphs., 3 tbls. 6 refs.

Results of shear tests on resorcinol and resorcinol/phenol glue joints of 29 tropical

American woods, ranging in sp.gr. from 0·40 to 1·22, are given in graphs and tables. *Quercus alba* and *Tectona grandis* were also included as controls. The woods are classified from the results as easy, moderately easy, or requiring special care to glue. Most species with a sp. gr. of less than 1·00 were satisfactorily glued by normal methods and gave joints virtually as strong as the wood itself. Substantial joint strength was developed with even the heaviest woods except *Guaiacum officinale*, which needed a preliminary surface treatment with NaOH to give satisfactory results. Further work, using other adhesives, is needed.

2128. **Properties of adhesives.** *Rep. For. Prod. Res. Bd., Lond. 1939–47*, 1950 (33–4, 68–9).

2129. **Adhesives.** *Selected Government Research Reports, Ministry of Supply, London* 7, 1950. pp. 89. Price 7*s.* 6*d.* P.R.

Includes 5 reports: (1) synthetic-resin glues (preliminary study of factors affecting the strength of glued joints in Al alloys); (2) and (3) adhesion of glues to plywood; (4) tests to determine the effects of various types of adhesive on the final shape of laminated bends; (5) the part played by formaldehyde in dermatitis attributable to synthetic-resin glues.

2130. M., K. S. **Synthetic resin adhesives. Gluing problems in plywood making and veneering.** *Cabinet Mkr.* No. 2657, 1950 (1096). P.R.

2131. **'Aerolite' 300 for commercial bodies.** *Bull. Aero-Res., Duxford* No. 93, 1950. pp. 4. P.R.

2132. Brandts, T. G. Beproeving van de koudhardende kunstharslijm Cellobond J 2771. **[Tests on the cold-setting synthetic-resin glue Collobond J 2771.]** *Rapp. Bosbouwproefsta. Buitenzorg* No. 37, 1950. pp. 7. [Du.du.jav.e.]

Joints glued with Cellobond J 2771 showed satisfactory shear strength and resistance to boiling and soaking.

2133. **Special heating methods of setting glues.** *Rep. For. Prod. Res. Bd., Lond. 1939–47*, 1950 (34–9, 70–1).

Data on radio-frequency and infra-red heating, and a description of the apparatus used.

2134. Lacey, P. M. C., and Howe, H. A. **Radio frequency and other heating processes. Progress report 7. Study of glues for setting by the glueline method.** For. Prod. Res. Lab., Lond. 1950. pp. 2 + 22. P.R.

2135. Holland, F. W. **Radio glue setting and radio frequency heating.** *Wood* 15 (11), 1950 (426–9).

2136. Miller, D. G. **Radio frequency bonding of laminated beams.** *B.C. Lumberm.* 34 (8), 1950 (47–8, 110, 112).

The principal features of radio-frequency heating for bonding laminated beams are reviewed, and a description is given of a practical eleetrode system developed at the Ottawa laboratory.

33.17. Sawmilling and Machine Planing

See also *For. Abstr.* 12 (No. 2079).

2137. Wright, G. W. **Swedish sawmilling practice.** *Aust. Timb. J.* 16 (6), 1950 (408–9, 411, 413, 417, 419, 421, 423–4).

Swedish and Australian methods are compared.

2138. Turnbull, R. F., and Colwell, S. J. **Timber conveying in the sawmill.** *Aust. Timb. J.* 16 (3), 1950 (203, 205, 207–10).

2139. Pavitt, H. A. **Steel used in the cutting of wood.** *Sth. Lumberm.* 181 (2269), 1950 (39–40).

A paper presented at a meeting of the American Society of Mechanical Engineers which describes briefly the design, properties and uses of saws made of different steels.

2140. Haycock, A. H. **Sawing and planing.** Technical Press, Ltd., London. 1948. pp. xi + 132. Price 10*s.* 6*d.* P.R.

Written primarily for apprentices. Includes sections on: (1) circular rip saws; (2) circular cross-cutting saws; (3) dimension saws; (4) the narrow bandsaw; (5) planing machines.

2141. Knežević, M. Prilog oformljenju nazuba gaterskih, kružnih i testera pantljičara. **[The design of saw teeth for frame, circular and band saws.]** *Šum. List* 73 (12), 1949 (385–406). 2 refs. [Croat.e.]

Discusses in detail the method of calculating the gullet dimensions and the height of the

teeth, on the basis of Flatscher's theory of saw design.

2142. HOLIMON, R., LEUTHOLD, J. H., AGATHER, A. J., and PIERSON, W. M. **Care of saws for frozen logs.** *Lumberm.* 77 (11), 1950 (77).

The following practices for sawing frozen logs obtain respectively at 4 different mills in northern U.S.A.: (1) A winter saw with 2¼-in. tooth space and 35° hook, replaces the summer saw with 2-in. tooth space and 25° hook. (2) Saw speed is reduced from 9,500 to 8,400 ft./min., saws used have 2-in. tooth space and 32° hook, they are changed frequently and kept sharp, 13-gauge saws with sliver teeth are used and saws are swaged to 6-gauge and reshaped to 7-gauge. (3) Speed is reduced from 10,000 to 8,000 ft./min., logs are stored in a hot pond long enough to remove frost from about 50–60% of the log's perimeter. (4) Swage is reduced, and hook is increased to about 40°. These changes are made gradually as frost increases during the winter and are gradually reversed in the spring. No change is made in tooth space (2 in.) or saw speed (10,000 ft. per min.).

2143. HYLER, J. E. **Bandsaw types are many but fall into two general groups.** *Wood-Worker, Indianap.* 79 (6), 1950 (38–40). P.R.

Classification of bandsaws used for straight and for curved sawing, and description of some models now in use.

2144. LARKINS, R. M. **Efficient use of circular saws.** *Scot. For.* 4 (3), 1950 (76–7).

2145. JACOB, G. R. **Forest waste and its conversion by circular gang-saw mill.** *Emp. For. Rev.* 29 (3), 1950 (211–8 + 8 photos).

Describes a new plant and new milling methods developed to meet the growing problem of the profitable utilization of low-grade small timber, both conifer and hardwood, from silvicultural thinnings and scrub clearance in the U.K. The plant incorporates machines specially designed to produce square-edged stock from small round timber by fast sawing into small dimensions and squares, and re-sawing, into smaller sizes, mainly by semi-skilled labour. The machines described include 2 twin-blade circular saws, fed by a cross-cut designed for crooked hardwoods of 3–14 in. diam. and a cross-cut for softwood thinnings, a 12-blade slasher and a multiple re-saw for small-dimensioned stock. The mill, which adjoins and is run in close connexion with an orthodox sawmill, draws its supplies, quite unselected, from a radius of 70–80 miles. The machinery is so designed that it will also be able to deal, in 10 or 15 years' time, with the larger thinnings which will then be available.

2146. GOTTSTEIN, J. W., and ROBERTS, H. D. **The Christensen and Crozier log edger sawmill.** *For. Prod. News Lett. C.S.I.R. O. Aust.* No. 181, 1950 (1–3).

Describes a portable mill with a log edger specially designed for small-girth logs. The edger, mounted on a steel chassis, consists of two 44-in. circular saws, the width between which can be adjusted from 6 in. to 20 in., plus docker and cross-cut saws, all Diesel-driven. The edger can produce 112 super. feet (Hoppus) per man-hour. A patent has been applied for by the inventors, Messrs. William Christensen and R. Crozier.

2147. MOFFETT, L. **Sawing California Douglas Fir for grade.** *Timberman* 51 (11), 1950 (118–21).

Better grades are obtained if the logs are flat sawn; the knots then appear running at right angles to the face of the board, as round or oval, rather than as spiked or branched knots. Californian Douglas Fir is generally rather soft in texture, and raised grain rarely develops as a result of flat sawing. Sawing in random widths gives the best financial return for shop-grade timber. After this has been sawn from the log, a smooth core with small knots often remains, which may be ripped into dimension sizes or sawn for common boards. For shop grades, the timber should be well seasoned, but common boards and dimension stock for house building will be de-graded by nearly a full grade when the seasoning is carried from partially to thoroughly dry, without any improvement in the properties of the timber in use.

2148. SUSMEL, L. Criteri di segagione e riduzione delle perdite. [**Technique of sawing and the reduction of waste.**] *Ital. for. mont.* 5 (3), 1950 (97–103). [It.f.g.]

Reviews progress made in sawing technique and emphasizes the importance of careful

choice of assortments for a log of given diameter, in order to reduce waste to a minimum.

2149. CARPENTER, R. D. **Amount of chippable waste at southern Pine sawmills.** *Occ. Pap. Sth. For. Exp. Sta.* No. 115, 1950. pp. 7.

Summarizes and tabulates the results of a study made between October 1948, and February 1950, on the amount of wood waste from Pine (chiefly Loblolly and Shortleaf), suitable for pulp chips, produced at 16 sawmills of different classes.

2150. BRYANT, L. H. **The utilisation of sawmill waste.** *Aust. Timb. J.* 16 (4), 1950 (269–70, 272, 274, 303). [Forestry Commission of N.S.W.]

A paper read at the 10th meeting of the Eastern States Timber Industry Stabilization Conference, held in May, 1950, at Nowra, N.S.W.

2151. **Mechanical hand planing.** *Timb. Tr. J.* 195 (3817), 1950 (251).

Describes the 'finger-feed' planer.

33.3. *Chemical Treatment*

Use of Wastes

2152. SCHWARTZ, E. A. **Squier bark crusher.** *Paper Tr. J.* 131 (10), 1950 (156, 158). P.R.

Describes a new unit designed for handling bark from barking apparatus to boiler house, and for producing desirable types of finished (ready for burning) bark.

2153. MARSHALL, H. B., and JOHNSON, A. M. [Compilers]. **Utilization of waste sulphite liquor. A bibliography of the literature from July 1943 to December 1949.** *Report, Research Council of Ontario, Toronto* No. 4–4–50, 1950. pp. 5 + 103. P.R.

2154. BENDER, F. **Calcium removal from sulphite liquor by electrolysis.** *Pulp Paper Mag. Can.* 51 (8), 1950 (73–6). 7 refs.

Describes laboratory experiments and the application of the results to the evaporation of sulphite waste liquor.

33.32. Pulp and Paper Manufacture. Wallboards. Plastics

See also *For. Abstr.* 12 (Nos. 2080–1, 2152–4, 2264).

2155. JARLSBY, O. T. Treforedlingsindustrien i dag. [**The pulp and paper industry today.**] *Norsk Skogind.* 4 (7), 1950 (181–2, 184–5). [Nor.e.] P.R.

Surveys equipment, labour problems, supply of pulpwood, and output in the Norwegian pulp and paper mills.

2156. RITCHIE, J. L. **Wood pulp and pulpwood statistics.** *Fibre Contain.* 35 (8), 1950 (124–32). P.R.

Includes tables of pulpwood receipts, consumption and inventories, cords of wood per ton of pulp (by regions and by pulp grades), quantities of various species used, and species used in different pulp grades. The data refer to U.S.A. only and cover mainly the last 10 years.

2157. CRUIKSHANK, J. W. **1949 pulpwood production in the South.** *For. Surv. Release Stheast. For. Exp. Sta.* No. 35, 1950. pp. 26 + 1 map.

33.32.1. *Pulp Manufacture*

See also *For. Abstr.* 12 (Nos. 2006, 2083–4, 2149).

2158. GUSTAFSSON, G. R. Roberts-Slipstolen och dess användning i de nordiska länderna. [**The Roberts grinder and its use in Scandinavia.**] *Pap. ja Puu* 32*B* (11), 1950 (347–51). 15 refs. [Sw.e.] P.R.

2159. GREIDER, H. W., MACARTHUR, R. A., and GISCHIG, L. C. **Rotary screen for laboratory separation of shives from mechanically prepared wood pulp.** *Bull. Amer. Soc. Test. Mat.* No. 169, 1950 (27–30). P.R.

Describes a laboratory screen for separation of shives, according to their lateral dimensions, from mechanically prepared wood pulp. (A wood shive is defined as a fibre bundle having a minimum lateral dimension.) The use of this screen in conjunction with the Bauer-McNett classifier, which evaluates fibre length, affords substantially complete estimation of the dimensional characteristic of mechanical wood pulp. ***Authors' synopsis.***

2160. Murto, J. O., and Perolahti, O. Selluloosapuun lastutus V. Keittolastujen koeseulonta. [**Chipping of pulpwood V. Classifying of pulpwood chips.**] *Pap. ja Puu* 32*B* (10), 1950 (309–17). 7 refs. [Fi.e.] [Oy Keskuslaboratorio, Helsinki.] P.R.

Discusses the use of screening methods for classifying chips. [Cf. *For. Abstr.* 11 (No. 3007).]

2161. Gustafsson, G. R. Litteraturöversikt beträffande metoder för bestämning av ligninhalt, uppslutningsgrad och blekbarhet hos sulfitmassa. [**Review of literature on methods for determining lignin content, cooking degree and bleachability of sulphite pulp.**] *Pap. ja Puu* 32*B* (4a; 5; 6), 1950 (45–50; 145–51; 177–85). 361 refs. [Sw.e.] P.R.

2162. Holzer, W. F. **Relation between wood and pulp properties.** *Pulp Paper Mag. Can.* 51 (10), 1950 (163–4, 166). 3 refs.

The differences in pulp quality caused by differences in wood structure (between hardwoods and softwoods, different species, and trees grown at different rates) and by decay, are discussed.

2163. Haywood, G. **Effect of variation in size and shape of fibres on papermaking properties.** *Pulp Paper Mag. Can.* 51 (9), 1950 (77–89).

The following results are drawn from a large number of reports by members of the West Virginia Pulp and Paper Co.:—(1) Coniferous woods yield pulps with an average fibre length of 2–3 mm. The proportion of thick-walled fibres varies widely with growth conditions. (2) Hardwoods yield pulps with a fibre length less than ⅓ that of coniferous pulps, varying widely with species. Some hardwoods yield pulps containing up to 30% ray fibres—i.e. fibres less than 0·2 mm. in length. Most hardwood pulps contain a predominant proportion of thick-walled fibres; major exceptions are Birch and Aspen. (3) Hardwood pulps yield papers low in tear strength, particularly in the lower freeness range. However, tear strength does not seem to be a direct function of fibre length. Hardwood pulps yield more opaque papers than coniferous pulps, probably as a result of the thickness of the fibre walls. (4) Pulping and bleaching processes play an important part in determining yield, quality and papermaking properties of pulp.

The data leading to these conclusions are tabulated.

2164. Lehrbas, M. M. **Wood density influences pulp yield.** *Sth. For. Notes Sth. For. Exp. Sta.* No. 68, 1950 [4].

The yield of screened kraft-type sulphate pulp that can be secured from Southern Pine wood of various densities has been determined by the Forest Products Laboratory, Madison, Wis. Yields were found to increase from 10·2 lb. of pulp from 1 cu. ft. of oven-dry wood of 22 lb./cu. ft. density, to 17·4 lb. from wood of 36 lb./cu. ft. density. The approximate yield of moisture-free pulp per cu. ft. of wood with any density from 22 to 36 lb. can be calculated by multiplying the density (in lb./cu. ft. oven-dry) by 0·509 and subtracting 0·96 from the answer. The samples tested included *Pinus taeda*, *P. palustris*, *P. echinata* and *P. caribaea* varying in growth rate and in amounts of summerwood and compression wood. No correlation was found between yield % (lb. of pulp per 100 lb. of wood) and density.

2165. Schafer, E. R., and Hyttinen, A. **Effect of the moisture content of wood on the groundwood pulping of White Spruce and Quaking Aspen.** *Paper Tr. J.* 131 (5), 1950 (26–9). P.R.

Experiments were made with wood ranging in moisture content from that of nearly green wood to about 11%. It was found that a decrease in the moisture content tended generally (*a*) to decrease freeness and fibre length of both the Spruce and Aspen pulps, (*b*) to decrease bursting and tensile strength for the Spruce pulps, (*c*) to increase these strengths in the Aspen pulps, and (*d*) to increase the energy consumption in most cases. *From authors' summary.*

2166. **Quality of newsprint.** *Rep. N.Z. For. Serv. 1949–50*, 1950 (12–13).

Tests of the suitability of New-Zealand-grown *Pinus radiata* for the production of newsprint were made at Lufkin, Texas, at a mill which has a special process for eliminating resin trouble in the manufacture of groundwood pulp from Pine. The exceptional strength of the New Zealand sheet is shown by the fact that it was possible to produce a 28-lb.

sheet at 1,440 ft./minute, probably a world's record for such a light-weight product.

2167. KOVALEV, V. P. Ispol'zovanie sosnovoy drevesinȳ dlya proizvodstva drevesnoy massȳ. [**The utilization of Pine wood for the manufacture of pulp.**] *Bumazhnaya Promȳshlennost', Moskva* 24 (2), 1949 (27–31). [Russ.] L.S.

Describes experiments carried out in the U.S.S.R. since 1934. The main difficulty in the use of Pine as pulpwood is the resin content. It was found that the resin (consisting of hydrocarbons, acids and glycerol esters of fatty acids) already undergoes a chemical change in the pulping process, viz. the acids of the resin interact with carbonates and bicarbonates of alkaline-earth metals contained in water. The resin difficulties can be eliminated either (1) by transforming resin into a solid compound which will spread filler-like throughout the fibre, or (2) by using soft water in order to prevent the reaction between the carbonates and resin. Both methods tried in Soviet mills gave good results.

2168. SINGH, C. **Interim report on the manufacture of newsprint from Paper Mulberry (*Broussonetia papyrifera*).** *Indian For. Bull.* (*n.s.*) No. 143, 1950. pp. 13 + specimen sheet of newsprint.

Investigations have indicated that *B. papyrifera* is a promising raw material for the manufacture of newsprint.

2169. RENIER, M. Les bambous des plateaux du Kwango, matière première de la pâte à papier. [**The Bamboos of the Kwango plateaux: a possible raw material for pulp.**] *Bull. agric. Congo belge* 41 (3), 1950 (741–64). [F.flem.]

Discusses in considerable detail the possibility of founding a pulp industry to exploit the Bamboo (*Bambusa vulgaris*) savanna of the Kwango plateaux in Belgian Congo.

2170. PIATTI, L. Zellstoff aus Bambus—seine Fabrikation in Indochina. [**Cellulose from bamboo—its manufacture in Indochina.**] *Textil-Rundschau, St. Gallen* 11 (8; 9), 1947 (292–8; 330–40). [G.g.f.] B.C.I.R.A.

[Cf. *For. Abstr.* 11 (No. 489).]

33.32.3. *Wallboards, Fibreboards, etc.*

See also *For. Abstr.* 12 (Nos. 1996, 2036).

2171. KLAUDITZ, W. Zum Stand der Forschung und technischen Entwicklung auf dem Gebiete der Herstellung von Holzfaser- und Holzspanplatten. [**Present state of research and technical development in the field of wood-fibre and wood-shaving board manufacture.**] *Mitt. öst. Ges. Holzforsch.* 2 (5), 1950 (109–17). [G.g.] P.R.

2172. VOELSKOW, P. Die Bearbeitung und Verbindung von Holzspanplatten. [**Machining and jointing of wood-shaving boards.**] *Holz* 4 (9), 1950 (173–7). [G.] P.R.

Describes various methods for machining and jointing wood-shaving boards used for cores of furniture boards, panels, doors, etc.

2173. KISSER, J., KÖLI, G., and STEININGER, A. Mikroskopische Untersuchungen an Holzfaserdämmplatten. [**Microscopic investigation of wood fibre insulation boards.**] *Mitt. öst. Ges. Holzforsch.* 2 (4), 1950 (85–93). 16 refs. [G.g.] P.R.

Results, with tables and diagrams, of tests on three boards of different origin [(1) Defibrator, coarse, (2) ditto, fine, (3) pulp] for: (*a*) composition of fibre material and the contents of single fibres, fibre bundles, and wood splinters, (*b*) fibre length, (*c*) deformation of fibres, (*d*) behaviour of the primary wall and nature of the fibre breaking point, (*e*) intertwining and bonding of fibres, and their orientation in the board, and (*f*) sizing of boards.

2174. ROWLEY, F. B., and LAJOY, M. H. **Impact strength testing machine [for testing structural insulating boards].** *Technical Paper, Engineering Experiment Station, University of Minnesota* No. 65, 1949. pp. 16. P.R.

A new machine is described and illustrated, and various test procedures discussed.

2175. NEUBAUER, L. W. **Redwood boards: durability studied in 12-year test of decay-resistance and weathering.** *California Agriculture, Berkeley, California* 3 (1), 1949 (15–6). L.S.

Untreated Redwood fibreboards of various grades were set on end 24 in. into loamy soil for a period of 12 years, then examined and tested for strength. A Douglas Fir and a White Pine

board included for comparison had broken after 3 and 4 years respectively. Results showing the condition of the boards in relation to weathering and the presence of termites, and their strength, are tabulated. Light boards were best in appearance, but heavy boards gave the best results in strength tests. Weakness generally developed a few inches below the ground surface; there was no appreciable weakening in the upper half of the boards. Termites and fungi appeared to have little effect above the ground line.

33.36. Wood Finishes. Preservation of Wood. Seasoning and Drying

See also *For. Abstr.* 12 (No. 2217).

33.36.1. *Preservation against Attack by Plants and Animals*

See also *For. Abstr.* 12 (Nos. 1996, 2026, 2126).

2176. ELLIS, C. **The preservative treatment of timber in Queensland.** *Aust. Timb. J.* 16 (4), 1950 (267, 303–4). [Queensland Forest Service.]

A paper read at the 10th meeting of the Eastern States Timber Industry Stabilization Conference, held in May, 1950 at Nowra, N.S.W.

2177. **Report of committee 17—wood preservation.** *Bulletin, American Railway Engineering Association, Chicago* 51 (484), 1949 (343–61). L.S.

Includes progress reports on: (*a*) service test records of treated wood, (*b*) protection against marine organisms, (*c*) creosote/petroleum solutions, (*d*) new impregnants and procedure for increasing the life and serviceability of wood products, (*e*) incising, and (*f*) urea impregnation for retarding checks (Beech and Hard Maple).

2178. BONINO, G. B., CIFERRI, R., and MORSELLI, G. (to Società Elettrica ed Elettrochemica del Caffaro). **Wood preservative.** *Ital. Patent* No. 436,820, June 14, 1948. *Chem. Abstr.* 44 (13), 1950 (6078). P.R.

A method of simultaneous protection of structural timber against fungi and animal life by polyhalogenated phenols and quinones, with or without the addition of Zn or Hg salts, nitrobenzene, and tar distillates.

2179. GRINDROD, J. **Wood preservation. The use of arsenic compounds.** *Builder, Lond.* 178 (5587), 1950 (366). P.R.

Describes the Boliden wood preservation method.

2180. WALTERS, C. S. **Penetration tests.** *Wood, Chicago* 5 (9), 1950 (31). P.R.

Describes a new method for determining the depth of penetration of light-coloured oil-soluble preservatives by using oil-soluble dyes.

2181. EECKHOUT, L., and HOLDER, J. VAN. Proeven met bederfwerende stoffen voor hout. **[Tests with wood preservatives.]** *Mededelingen van de Landbouwhogeschool en de Opzoekingsstations van de Staat te Gent* 24 (2), 1949 (145–58). 23 refs. [Flem.flem.f.e.] L.S.

Results of laboratory tests on two pentachlorophenol preparations, Pentoxol and Permatox, are tabulated. Blocks of Limba treated with different concentrations of the chemicals were exposed to attack by 14 of the commonest wood-destroying fungi and the loss of weight was compared with that of untreated controls of Limba, *Pinus* sp. and *Populus* sp. The treated blocks resisted better. Limba is, however, naturally rather resistant to fungus attack and not a suitable subject for the experiments.

2182. KRAUSE, R. L. **Reducing blue stain losses in lumber.** *Sth. Lumberm.* 181 (2265), 1950 (45–6, 48–51, 53–4). 17 refs. [E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.]

A review of methods of controlling attack by insects and fungi on stored logs by chemical treatment and correct piling procedure.

2183. BECKER, G. Verfahren und Ergebnisse der Prüfung von Holzschutzmitteln gegen Insekten. **[Methods and results in testing preservatives for the protection of wood against insect attack.]** *NachrBl. dtsch. PflSchDienst.* 27 (9), 1947 (137–43). 25 refs. [G.] [Materialprüfungsamt Berlin-Dahlem.]

A review of German work.

2184. **Report of the committee on the protection of building timbers in South Africa against termites, wood-boring beetles and fungi.** National Building Research Institute, South African Council for Scientific

and Industrial Research, Pretoria. 1950. pp. 14 + 218. P.R.

Includes sections on: (1) termite species known to infest buildings, (2) mode and degree of such infestation by termites, (3) survey of existing termite-proofing practice, (4) eradication of subterranean termite colonies and soil poisoning, (5) recommended practice for proofing new buildings against termites, (6) and (7) mode and degree of infestation by woodboring insects and of fungal decay in woodwork in buildings, (8) chemical impregnation of timber. Two appendices contain relevant Government regulations. [Cf. *For. Abstr.* 12 (No. 3183).]

2185. **Protection of timber against termites.** *Rep. For. Dep. Uganda 1949*, 1950 (22).

Specimens of sawn timber of *Alstonia boonei* (*congensis*), *Entandrophragma angolense*, *Khaya anthotheca*, *Maesopsis eminii*, and poles of *Maba abyssinica*, were treated by overnight cold-soaking in a 5% solution of DDT in Dieseline, and then sunk half their length in the ground. Twelve months later, the controls had almost all disappeared, but the treated specimens were 100% sound except for two specimens very slightly attacked.

2186. KOWAL, R. J. **BHC protects logs and lumber from pin hole borers.** *J. For.* 48 (8), 1950 (333). [Bureau of Entomology and Plant Quarantine, Gulfport, Miss.]

An oil solution of 666 (BHC) sprayed on recently cut logs, will protect them for at least 4 months against the heaviest beetle populations and in the warmest, dampest summer weather in the Gulf Coast states. The chemical remains effective even after treated logs have been in water storage. The concentration of the γ isomer of BHC in oil is about 0·5%, or 14 lb. technical grade BHC (12% γ isomer) to 50 gal. No. 2 fuel oil. The solution costs about 16 cents/gal. and 1 gal. will spray 100 sq. ft. of bark—roughly the surface of a 24-in., 16-ft log. Emulsions of 666 in water are much less effective on logs, but are very satisfactory for protecting lumber. [Cf. *For. Abstr.* 11 (No. 2851).]

2187. BROWNE, F. G. **Protection of timber against powder-post beetles during seasoning.** *Malay. Forester* 13 (3), 1950 (166–7). [Forest Research Institute, Kepong.]

A test of various insecticides was made on 12 samples each of *Dyera costulata*, a timber very liable to powder-post-beetle attack, in a seasoning shed known to support a large population of *Minthea rugicollis* and *Heterobostrychus aequalis*, the two most common and destructive species of powder-post beetles in Malaya. The insecticides were brushed on, the treatments being as follows:—A, untreated controls; B, Gammexane P 520 in water at a concentration of 12oz./gal. (= 0·5% γ BHC); C, a proprietary preservative based on pentachlorphenol; D, a 4% emulsion of DDT in water; E, a 5% solution of pentachlorphenol in aromatic gas oil; F, 'E605' in water, at a concentration of 1 : 400 by volume. After 9 months, treatments B and D showed no sign of attack by either beetle, though treatment B showed a slight (8·3%) infestation by *M. rugicollis* after 10 months. The infestation % after 9 months for the other treatments was as follows:—*M. rugicollis*, A, 72·7; C, 91·7; E, 90·9; F, 40; *H. aequalis* (a comparatively light infestation), A, 33·3; C, 18·2; E, 40; and F, 20.

2188. **Laboratory tests of insecticides and preservatives.** *Rep. For. Prod. Res. Bd., Lond. 1939–47*, 1950 (29–30, 80–1).

Experiments have shown that vacuum impregnation of sapwood of English Oak with a 3% kerosene solution of pentachlorophenol did not prevent egg-laying or hatching, but that larvae died soon after hatching; failure of short (1–3 minutes) dipping treatments was probably due to insufficient penetration. Contact with surfaces treated with Gammexane appeared to have a more rapid but less permanent effect on beetles than with those treated with DDT. Samples of decayed Oak sapwood were treated and exposed to infestation by *Xestobium rufovillosum*. Beetles in contact with material treated with DDT lived longer than those exposed to Gammexane. No eggs were laid on treated samples, but egg-laying took place normally on controls. *Lyctus*, furniture beetles and death-watch beetles allowed to walk on surfaces treated with 5% DDT dust soon became coated on ventral and dorsal surfaces, but when transferred to untreated surfaces they were able to get rid of the dust and lived almost as long as controls. When surfaces infested with *Lyctus* or furniture beetles are treated with polish containing Gammexane or DDT, emergence of insects is affected but not entirely prevented;

a high % are killed before the emergence hole has been completed.

2189. **Prevention of infestation by *Lyctus* in sawn timber.** *Rep. For. Prod. Res. Bd., Lond. 1939–47*, 1950 (28–9, 80).

Preliminary trials with DDT and Gammexane suggest that these chemicals are effective, but control specimens were not found to be heavily infested.

2190. **[Boric acid as a wood preservative.]** *Rep. Dep. sci. industr. Res. N.Z.* 1950 (68).

It was found that when green Tawa [*Beilschmiedia tawa*] was impregnated with boric acid by diffusion treatment, the loading could be calculated from a known treatment time and solution concentration for times between 1 and 16 hr. and concentrations between 1 and 4%. Evenly distributed loadings, adequate for the prevention of insect attack, were obtained in 1-in. boards from 1-hr. treatments in 4% solutions at 83° C., provided that treated timber was held under conditions of restricted drying for 2 weeks after treatment.

2191. Demann, W., and Herzig, J. Imprägnierung von Grubenholz. **[Impregnation of colliery timber** [: a review].] *Bergfreiheit* 15 (3), 1950 (12–5). [G.] *Abstr.* in *Glückauf, Essen* 86 (25/26), 1950 (533). D.S.I.R.

2192. Technau, G. Neuzeitliche Imprägnierung des Mastenholzes. **[Modern impregnation of pole timber.]** *Elektrizitätswirtschaft, Göttingen* 49 (2), 1950 (59–63). 6 refs. [G.g.] L.E.E.

A review of modern methods.

2193. Kleyn, A. V., and Kulish, P. A. Novŷ sposob sokhraneniya drevesinŷ. **[New method of preservation of timber.]** *Elektricheskie Stantsii, Moskva* 20 (12), 1949 (14–5). [Russ.] L.S.

Describes a method of preserving poles *in situ* by filling a funnel-shaped hole dug around the pole with iron-ore roasting residues which contain salts of Cu, Zn, Fe, Pb, Al, As, etc. The maximum height reached by the diffusing salt solution varies from 0·4 (poles) to 3·0 m. (wooden pillars under roof). Tests carried out with pyrites roasting residue showed that impregnation went underground as well, to a depth of 1·8–2·0 m. Diagrams are given of the penetration of various substances at different concentrations and at various levels of a pole, ten years after treatment. The impregnated portions were resistant to rot when the top, untreated portions had rotted right through. The treatment stops incipient fungus attack.

The average life of untreated poles in Leningrad province is 3–5 years; a very conservative estimate for treated poles is 2–3 times longer. 'Antiseptic dressings' containing pyrites roastings are suggested for particularly valuable portions of structures. Logs can be impregnated in dugouts, roastings and water simply being added. It is suggested that roastings should be used for that purpose throughout the country, and that relevant research should be carried out.

2194. Technau, G. Die Konservierung des Mastenholzes mit Salzen. **[The preservation of pole timber with salts.]** *Fernmeldetechnische Zeitschrift* [*FTZ*], *Frankfurt/Main* 2 (11), 1949 (341–5). 2 refs. [G.] L.E.E.

Review of impregnation methods (pressure, Kyan, sap-displacement, osmotic), and comparison of the effectiveness of $CuSO_4$, $ZnCl_2$, $HgCl_2$, NaF, and other fungicides.

2195. **Wood preservation.** *Rep. N.Z. For. Serv. 1949–50*, 1950 (39).

The air drying of large-dimension Corsican-Pine stock such as poles, under unfavourable conditions, is accompanied by appreciable degrade due to decay. The rate of drying and the effect of light preservative treatment before stacking for air drying, have been investigated. The immersion of poles and posts in heated solutions of Na pentachlorphenate, followed by air drying, retards and minimizes but does not entirely eliminate infection by decay or staining fungi. Timber treated in this way appears to be in a satisfactory condition for sterilization, preservative treatment, and subsequent use.

2196. Walters C. S., and Kulp, D. A. **Report on Project 301-A. Preservative treatment of fence posts by cold-soaking in pentachlorophenol-fuel-oil solutions.** *For. Note Ill. agric. Exp. Sta.* No. 11, 1950. pp. 4. P.R.

Results of the annual inspection of 873 treated posts representing 14 species of hardwoods and 3 of softwoods in service for 7–86 months are tabulated.

2197. Stacey, W. A. **Treated wood screens in relief wells for river levees.** *Wood Pres. News* 28 (8), 1950 (92–4, 104). P.R.

Describes slotted wood screen wells used in the agricultural levee system under construction along the Missouri river for alleviating high uplift pressures at the rear of levees and preventing the destruction of levees by uncontrolled seepage. The screens are made from Douglas Fir staves, pressure-treated to a final retention of 10 lb. of creosote or 12 lb. of 50/50 creosote/petroleum mixture per cu. ft. of wood.

33.36.3. *Seasoning. Drying*

See also *For. Abstr.* 12 (Nos. 2118, 2126, 2177, 2187, 2195).

2198. Czepek, E. Künstliche Holztrocknung in der Praxis. [**Artificial drying of timber in practice.**] *Holz* 4 (9), 1950 (169–73). 7 refs. [G.g.] P.R.

Discusses the problems of drying timber at temperatures above 100° C.

2199. Crews, A. G. **New gas fired lumber dry kiln.** *Timberman* 51 (10), 1950 (68, 70).

[Cf. *For. Abstr.* 12 (Nos. 1403–4).]

2200. **Low temperature kiln drying.** *Lumberm.* 77 (9), 1950 (87).

The kiln interior has double parallel tracks with Masonite doors hung across them, dividing the kiln into 6 compartments, each holding 2 kiln trucks. A drive-shaft runs parallel to the outside of each track. Three fans are operated by each shaft; they are arranged alternately, one fan to each compartment, and the air is blown in opposite directions across adjacent compartments; 100,000 cu. ft. of air per minute alternates through the kiln. Total capacity is *ca.* 72 M. bd. ft., or 6 M. per truck. Drying schedule for Pine framing and some Poplar timber is 175 hours at an average temperature of 130° F. It is claimed that the timber has kiln-dried brightness and air-dried softness, and is produced in roughly ¼ the time needed for air drying.

2201. **Seasoning (novel methods).** *Rep. For. Prod. Res. Bd., Lond. 1939–47*, 1950 (31, 60–1).

Wood samples have been dried by exposing one face to cool humid air while the other face has been kept in contact with an electrically heated copper plate; results indicate that accelerated drying may result from heating the core or centre of a board by R.F. methods and cooling the surfaces, but that a temperature gradient from face to face is not likely to be very effective. Green Beech has dried satisfactorily by the former method, but a much longer drying period is needed than for boiling and a normal conditioning period is needed to complete the drying.

Tests on the 'Irsay' vacuum treatment [*For. Abstr.* 8 (No. 501)] showed that 2¾-in. Beech could be dried satisfactorily from 90 to 35% moisture content in 1½ days. Difficulties and drying times increased rapidly, however, when fibre-saturation point was reached, and there were indications that refractory hardwoods, such as Oak, could not be dried so rapidly without considerable degrade.

Numerous tests have been made on the possibilities of extracting the moisture in wood by causing it to boil in an R.F. field; results have indicated that in green Oak steam pressures sufficient to rupture the fibres and cause serious surface and internal splitting are generated rapidly. Beech reacts rather more favourably, but degrade may at times be serious and results are rarely consistent. It is also difficult to dry to any definite and uniform moisture content without stressing the timber unduly. Specimens of Beech, Omu and Scots Pine have been treated in boiling acetone; results were poor. Results of tests on urea-seasoning were not encouraging.

2202. Die Schaukeltrocknung. [**Swing drying.**] *Holz, Augsburg* 4 (2), 1950 (28–30). P.R.

Describes the construction, operation, and results obtained with the use of a device for swinging timber loads during air drying. It is claimed that the time of drying is considerably reduced. The device is the subject of German Patent No. 674644 (1937).

2203. Garber, H. J., and Tiller, F. M. **Infrared radiant heating.** *Industr. Engng. Chem.* 42 (3), 1950 (456–63). 9 refs. P.R.

Discusses the use of infra-red radiation in the heating of materials of low thermal conductivity, with charts for calculating the variation of temperature with time. Simplified graphical solutions are presented for the temperature versus time at the top, centre

and bottom of the slab subjected to radiation. With high radiant intensities, it is possible to heat the surface of a thick material having a low thermal conductivity to a high temperature in a short period of time without greatly elevating the subsurface temperatures. The production of this 'skin effect' opens up the possibility of baking high-temperature finishes on the surface of wood without undue dissipation of heat, or warping or buckling. *From authors' summary.*

2204. DÉRIBÉRÉ, M. Applications du séchage par rayonnement infrarouge dans l'industrie du bois. **[Application of drying by infra-red radiation in the timber industry.]** *Rev. Bois Appl.* 5 (11), 1950 (19–23). 9 refs. [F.] P.R.

Review of literature for 1937–48, and the application of infra-red radiation for seasoning white wood up to some centimetres thick, or opaque wood (Mahogany, Walnut, Oak, Teak, Ebony) less than 1 cm. thick. Describes also an infra-red kiln of French manufacture for seasoning boards 5–25 mm. thick, cork, and sawdust; for polymerizing thermo-setting resins used for impregnation; and for extracting Pine seeds. [Cf. *For. Abstr.* 8 (No. 1267); 9 (No. 1188).]

2205. SMITH, H. H. **Further experiments in seasoning California Black Oak [*Quercus kelloggii*].** *For. Res. Notes Calif. For. Range Exp. Sta.* No. 75, 1950. pp. 8 + 2 dgms., 1 tbl.

Successful air- and kiln-drying trials were carried out on 1-in. boards up to 14 in. wide. [Cf. *For. Abstr.* 11 (No. 3101).]

2206. **Moisture tolerances.** *Rep. For. Prod. Res. Bd., Lond. 1939–47*, 1950 (31–2).

Furniture made from Oak kiln-dried to moisture contents averaging 20% and 16%, was kept in conditions calculated to bring the final moisture content to *ca.* 12%. The furniture was than inspected and graded according to visible defects, outward appearance, fit of drawers and quality generally. It was found that wood at a moisture content of more than 12–14% was liable to give trouble during actual manufacture and assembly, but that troubles later, though sometimes appreciable, did not necessarily make the final product unserviceable. A higher moisture content could safely be allowed for table-leg squares and no doubt for straight-grained wood shrinking less than Oak.

33.36.5. *Steaming*

2207. KNEŽEVIC, M. Gubitak toplote kod parenja drveta i izračunavanje potrebne količine pare. **[Consumption of heat during the steam treatment of [Beech] wood and the evaluation of the amount of steam required.]** *Godišnjak Poljoprivedno-Šumarskog Fakulteta, Beograd* 1, 1948 (243–64). [Serb. russ.f.] E.M.B.

Describes the application of thermodynamics to the evaluation of steam consumption in chambers for the steam treatment of sawn Beechwood; some constructional and operational details are emphasized.

33.37-8. Destructive Distillation. Charcoal and By-products. Use of Wood and Charcoal for Gas Manufacture

See also *For. Abstr.* 12 (Nos. 2006, 2272).

2208. GILLET, A. Parallèle entre la carbonisation des bois et leurs transformations en houilles au cours des âges géologiques. **[Parallel between the carbonization of woods and their transformations into coal in the course of geological periods.]** *Revue Universelle des Mines, Liége* 6 (9), 1950 (18–22). [F.f.] [Université de Liége.] D.S.I.R.

Reference is made to papers published in the same journal in 1946 and 1949, relating to an analogy between the gradual pyrolysis of wood and the geological evolution of coal from ligneous material. Three curves were derived illustrating the relation between temperature and the composition ($C_nH_mO_p$) of several coals and woods at different stages of pyrolysis. The curves were extrapolated in an attempt to identify the kind of wood from which the coal was formed. The analogy between slow geological carbonization and that under laboratory conditions is quite satisfactory so far as the curves for C and H content are concerned, less so in the case of O. It was deduced from the curves that the formula weight of selected Oakwood for pyrolysis was approx. $C_{36}H_{51}O_{28}$, as compared with the corresponding formula for cellulose $C_{36}H_{60}O_{30}$.

2209. ZENCZAK, P. **A new method of wood pyrolysis.** *Trend in Engineering at the University of Washington, Seattle* 2 (2), 1950 (27–30, 31). 7 refs. L.C.E.

Describes results of research on pyrolysis of wood (solid blocks or sawdust) in a high-boiling organic liquid (kerosene), the products being distilled over with it. The exothermic point of reaction of carbonization was lowered from 275° to *ca.* 265° C., while the speed of the reaction and the temperature were more easily controlled. A high heat-transfer rate and uniform heat distribution were obtained, thus reducing the time of distillation. The yield of acetic acid and soluble tars was also increased. The tars formed had a different constitution from that of ordinary process tars. The charcoal showed better physical and adsorbing properties. Loss of kerosene was claimed to be below 0·2%.

33.4. *Converted Structural Timber*

See also *For. Abstr.* 12 (No. 2224).

2210. EYRES, H. T. **The wearing properties of wood floors. (1) Principal influences of wear. (2) Wear in relation to structure. (3) Surface dressing.** *Wood* 15 (9; 10; 11), 1950 (305–8; 343–7; 404–6). 3 refs.

Includes a list of 20 commercially recognized species of flooring hardwoods, with their principal features. [Cf. *For. Abstr.* 11 (No. 2761).]

33.5. *Pitprops. Sleepers. Poles and Other Roughly Converted Wood*

See also *For. Abstr.* 12 (Nos. 1907, 2005, 2061–2, 2177, 2191–6).

2211. KARBA, D. Bukov prag. **[Beech sleepers.]** *Gozd. Vestn.* 6 (10), 1947 (235–8). [Sloven.]

Instructions for the better handling of Beech sleepers from stump to preserving plant, with emphasis on a quick orderly schedule. Jugoslav railways have 56% Oak, 34% Beech and 10% Pine sleepers, but with Oak increasingly devoted to exports, the % of Beech is steadily rising. It lasts only 2 years in service unless impregnated, which extends its life 25–30 years. More than 100,000 sleepers, mostly Beech, are now being consumed annually in Slovenia.

2212. BOOKER, C. A. **Comparative performance records—steel and wood transmission lines.** *Transactions, American Institute of Electrical Engineers, New York* 68 (Pt. 1), 1949 (686–9). 1 ref. L.S.

Comparison of data of electrical insulation and interruptions by lightning for various types of steel supporting structures with similar data for wood structures, confirms the conclusion reached about 1935, viz. that a properly designed wood line gives superior service in regard to interruption. Analysis of structural failures in the most severe storms demonstrates the reliability of wood when properly used and maintained.

33.6. *Packing Boxes, Crates, etc.*

2213. **Aspects of box manufacture.** *Sth. Lumberm.* 181 (2269), 1950 (56, 58, 60).

Describes methods and machinery.

2214. CONNELLY, H. H. **From furniture to boxes in war.** *Sth. Lumberm.* 181 (2269), 1950 (44, 46, 48, 50, 52, 54).

Discusses methods and equipment in box manufacture, and kinds of boxes, and lists 45 species available and suitable for boxes.

2215. BOYD, R. J. **Influence of nail head size and slat thickness on pull-through resistance of Colorado woods.** *Abstr. of thesis* in *J. For.* 48 (9), 1950 (396). [Colorado A. & M. College, Fort Collins, Col.]

A study was made to evaluate the suitability of a number of species for box or crate manufacture, in terms of resistance to pull-through of nails. Arranged in order of decreasing resistance, the species tested were:—*Pinus contorta* var. *latifolia, Populus tremuloides, Pinus ponderosa, Pseudotsuga taxifolia, Populus acuminata, Picea engelmanni* and *Abies lasiocarpa.*

33.8. *Other Manufactured Products*

See also *For. Abstr.* 12 (Nos. 2035, 2105, 2114).

2216. KOPPEL, C. VAN DE. Bestaat er een houtsoort die teak kan vervangen voor scheepsdekken in de tropen. **[Is there a timber that can replace Teak as decking for ships**

in the tropics.] *Ber. trop. Prod. ind. Inst. Amst.* No. 219, [1948]. pp. 9. [Du.e.] *Repr. from Schip en Werf* 15 (5), 1948 (78). L.S.

Results of an enquiry made among a number of shipbuilders and shipping companies are discussed. Pitch Pine and Oregon Pine were both found to give poor results in the tropics. Decking of *Hymenaea courbaril* on one ship, which has done 10 years in the tropics, is still in excellent condition. *Dipterocarpus alatus* gave good results on covered decks, but exposed decks were badly checked; their service life may, however, be sufficiently long to justify the use of the species. *Chlorophora excelsa* and a *Dipterocarpus* species, Bagac, from the Philippines, used before the war, were unsatisfactory. Some figures, obtained from literature, on shrinkage, strength properties and sp. gr. of the timbers mentioned are tabulated. [Cf. *For. Abstr.* 12 (No. 621).]

2217. HUBBARD, R. C. **A method of finishing small boats made from B.C. Douglas Fir plywood.** *B.C. Lumberm.* 34 (9), 1950 (78, 83).

Details are given of a 3-coat finishing system, using marine spar varnish, exterior white enamel and white enamel undercoating.

2218. **New plywood freight car.** *Wood, Chicago* Nov., 1950 (17–8, 44). P.R.

In the Pressed Steel Car Co.'s new 'Unicel' all-plywood goods wagon, the components are welded together into a single unit by a durable high-strength resin adhesive, producing a single organic structure similar to the fundamental concept behind modern aircraft. The stresses are distributed evenly throughout the car so that, though far lighter, it is much stronger than the conventional wagon. The principle of construction is a combination of monocoque shell and box girder, and the two skins of plywood are bonded to a framework of wood strips, forming a series of cells. Various special wagons have been designed for such commodities as sugar and flour, as well as refrigerator vans. A phenol-formaldehyde resin (Synco 128-CLW) was the adhesive chosen. The new wagon has been repeatedly impacted at speeds above 15 m.p.h. and the end of the wagon has been designed to sustain impact speeds of 23 m.p.h. Static-loading tests prove the wagon's rigidity; when uniformly loaded with 130,000 lb. of bricks, there was a downward deflection of the floor of only 0·09 in. The quantity of plywood used in the manufacture of the wagon is 4,500 bd. ft. The construction is described in detail. Entire weight of wagon is 46,000 lb.

2219. REHMAN, M. A., and KISHEN, J. **Indian woods for battery separators.** *Indian For. Bull.* No. 147, 1950. pp. 16. 9 refs.

Cf. *For. Abstr.* 7 (No. 1349). Results of tests show that physical, electrical and battery-performance properties of separators made of Fir (*Abies pindrow*) and Spruce (*Picea morinda*), are not inferior to those of Port Orford Cedar (*Chamaecyparis lawsoniana*). Deodar (*Cedrus deodara*) comes a close second. Kail (*Pinus excelsa*) separators have a lower mechanical strength.

2220. UYEMURA, T. **Wood for storage battery separators in Japan.** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 44, 1950 (101–16). 3 refs. [Jap.e.]

Experiments were made to test the suitability of 11 Japanese species. The properties tested were electrical resistance, tensile strength perpendicular to the grain, volatilizing organic-acid content, and tensile strength after soaking in H_2SO_4. The data are presented in a series of tables and graphs, the captions and legends to which are given partly in English as well as Japanese, but the *species names* in Japanese only. The following species show promise:—Hinoki [*Chamaecyparis obtusa*], Koyamaki [*Sciadopitys verticillata*], Aka-matsu [*Pinus densiflora*], Momi [*Abies firma*], Totomatsu [?*Abies sachalinensis*], Tsuga [*Tsuga sieboldii*] and Ezomatsu [?*Picea jezoensis*].

2221. MELLOR, H. C. **Modern applications of precision wood bearings.** *Machinery, London* 76 (1949), 1950 (304–9). I.C.I.

Describes wood bearings made (in U.S.A.) from uniformly close-grained hardwood blocks carefully treated and seasoned for a minimum of 4 years before being impregnated with a special non-oxidizing lubricant. The resulting material is 60% hardwood and 40% entrained lubricant. The bearings maintain their lubricating film indefinitely. Typical uses: coffee grinders, conveyor belts, artificial leg joints, etc.

2222. KÖSE, S. Kundura çivisi imali. **[Wood shoe-nail manufacture.]** *Orman ve Av* 19 (4), 1947 (72–6). [Turk.]

Description of this local handicraft as developed during World War II near Sürmone, N. Anatolia. Formerly such 'nails', which are preferred throughout Turkey to iron ones, were imported. *Betula* spp. make the best nails, but as they are scarce, Istric [*Carpinus* spp.] and *Acer* spp. are chiefly used, along with *Alnus*, *Corylus*, and Poplar in some quantity. The apparatus—a kind of wooden vice—in which the nails are fashioned from a block of selected wood by hand plane, and then split, and the tools employed, are illustrated in sketches. In one village having 70 such machines, 125 kg. of nails are produced per day from 25 machines. Six sizes of nail, varying from 10 to 20 mm. long, are manufactured.

2223. MCDERMID, H. B. **A power clamp for ladder-making.** *Wood* 15 (9), 1950 (324–5).

33.9. *Grading [including Standard Specifications] and Storage of Converted Timber*

See also *For. Abstr.* 12 (Nos. 2269–70).

2224. **British standards for building materials and components for housing.** *PD*1023: *Addendum* (to *Brit. Stand. Handbook* 3, 1947). No. 3, 1950. pp. 97. Price 5*s*. P.R.

2225. DIXON, L. B. **Standard British Columbia grading rules analyzed.** *B.C. Lumberm.* 34 (10), 1950 (45–7, 98, 100, 102).

2226. Pinho e legislação vigente. **[Pine and present legislation.]** Ministério da Agricultura, Serviço de Informação Agrícola, Rio de Janeiro. 1949. pp. 8. [Port.]

Rules for the classification of Pine [*Araucaria*] approved by the decree of 9th December, 1943.

34. MINOR FOREST PRODUCTS AND THEIR UTILIZATION

34.2. *Vegetable Products*

34.21. Fodder Grass and Grazing

See *For. Abstr.* 12 (Nos. 1876, 1952).

34.24. Bark Products. Tanning Materials. Cork

See also *For. Abstr.* 12 (Nos. 1840, 2006).

2227. ANET, F. A. L., HUGHES, G. K., and RITCHIE, E. **The chemical constituents of Australian *Flindersia* species. II. Braylin and brayleyanin.** *Aust. J. sci. Res.* 2*A* (4), 1949 (608–15). 11 refs. P.R.

Two substances, braylin, $C_{15}H_{14}O_4$, and brayleyanin, $C_{20}H_{24}O_4$, were isolated from the bark of *Flindersia brayleyana* F. Muell. By degradation and synthesis they were proved to be 6-methoxy-7,8-(2′2′-dimethylpyrano-5′6′) coumarin and 6- methoxy-7-(γγ-dimethylallyl-oxy)-8-(γγ-dimethylallyl) coumarin, respectively [cf. *For. Abstr.* 11 (No. 1890).] *Authors' summary.*

2228. TOPÇUOGLU, A. Palamut istihsali. **[Valonia production [from *Quercus aegilops*].]** *Orman ve Av* 20 (9), 1948 (179–181). [Turk.]

A brief account of this important industry, which is largely in private hands.

2229. MINČEV, B., POŽARLIEV, G. NIKOLČEV, K., and MARKOV, E. Problemŭt za izpolzuvane na mestni rastitelni dŭbilni materiali. **[The possible utilization of native [Bulgarian] tanstuffs.]** *Spisanie na naučno-izsledovatelskite Instituti pri Ministerstvata na Zemedelieto i Gorite, Sofia* 18 (2), 1950 (133–76). 27 refs. [Bulg.russ.f.]

Reports on the analysis of specimens of bark of *Picea abies*, *Abies alba*, *Quercus sessiliflora*, *Q. conferta*, and *Q. cerris*, wood of the 3 species of Oak, and leaves and twigs of *Rhus cotinus*. The Spruce bark contained 8·3–18% of tanstuffs, the highest content being found in trees 60–80 years old. Fir bark contained 5·5–7·3%; Sessile Oak bark 8·2–11·8%, decreasing with age and increasing with height in the tree; *Q. conferta* bark 5·8–13·2%, increasing with height in tree; *Q. cerris* bark 5·1–6·8%. The % of tanstuffs in the wood of the above species of Oak was 2·5–4·3, 1·7–2·9, and 0·77 respectively. Leaves and twigs of ordinary commercial Sumac contained 14·8–20·3%; leaves alone, up to 23·5%; twigs alone, 5·5%. The authors consider that if native resources were properly utilized, Bulgaria would become an exporter, instead of an importer, of tanstuffs.

2230. YABLOKOVA, V. A., and YAKIMOV, P. A. Anatomicheskoe i mikrokhimicheskoe issledovanie skumpii. **[Anatomical and microchemical investigation of *Rhus cotinus* [with special reference to the type and distribution of its tannin].]** *Bot. Zh. S.S.S.R.* 34 (6), 1949 (593–612). 22 refs. [Russ.russ.] [Vsesoyuzný Institut Rastenievodstva, Leningrad.] P.R.

Describes qualitative tests worked out by the authors for differentiating between pyrogallol tannin, pyrocatechin tannides and yellow pigments, by the colour of precipitates formed with various reagents. The tests were first tried on the pure substances and then as microchemical tests on sections of different tissues and organs of *Rhus cotinus*. By these methods it was established that the tannin of the aerial organs of *R. cotinus* is of the pyrogallol type, although at the base of the stem a small quantity of pyrocatechin tannin was detected in addition. The tannin and yellow pigment occurred both in separate cells and together in the same cell. Notes are included on the distribution of the tannin in the various organs, as revealed by the anatomical and microchemical studies made.

2231. BRYANT, L. H., and MARTIN, P. J. **Note on the relationship between tan content and hot water solubles in Black Wattle (*Acacia mollissima*) barks.** *Repr. from Journal, Society of Leather Trades' Chemists, Croydon* 34, 1950 (151–4). P.R.

A linear regression was shown to exist between hot-water solubles and tannin content of Black Wattle barks. An equation was derived from which tannin contents may be calculated for known values of hot-water solubles. *Authors' summary.*

2232. JENSEN, W. **Studies of suberin: I. The suberin in the outer bark of *Betula verrucosa*. II. The suberin in cork of *Quercus suber*. III. The structure of phellonic acid.** *Pap. ja Puu* 32*B* (9–10), 1950 (291–6 + 6 photos; 291–4). 16 + 18 refs. [E.] [Institute of Wood Chemistry, Åbo Akademi, Åbo, Finland.] P.R.

Cf. *For. Abstr.* 11 (Nos. 343, 561).

34.25. Medicinal and Edible Plants

2233. TÜRKES, V. **Orman ağaçlarının hastalık anlarında kullanılma usulleri. [The use of forest trees in the case of illness.]** *Orman ve Av* 21 (8), 1949 (174–5, 187). [Turk.]

Data collected from peasant lore and the works of several authors: 14 different genera of trees are cited for the curative properties of leaves, fruit, bark etc., including Oak galls, the bark and seed of *Juniperus oxycedrus*, and the young buds of *Pinus* spp.

2234. WEBB, L. J. **Guide to the medicinal and poisonous plants of Queensland.** *Bull. Coun. sci. industr. Res. Aust.* No. 232, 1948. pp. 202. ABD.R.

A comprehensive list of Queensland plant species, including many trees and shrubs, arranged alphabetically under family and genus, with summaries of available information on medical properties and toxicity to humans and stock. An index to botanical and popular names is provided.

2235. HUANG, K. C., and JANG, C. S. **Chia Chu Tao, the Chinese Oleander [*Nerium indicum* Mill.], as a cardio-tonic.** *Science and Technology in China, Nanking* 1 (2), 1948 (35–6). 6 refs. [E.] O.R.S.

The relative potencies of leaves, bark, wood and flowers, and the lethal dose, were determined and compared with similar data for digitalis. The potency of leaves is of the same order as the international standard of digitalis. Values for lethal dose are also comparable with those of digitalis.

2236. LAHEY, F. N., LAMBERTON, J. A., and PRICE, J. R. **Alkaloids of the Australian Rutaceae. The structure and reactions of acronycidine.** *Aust. J. sci. Res.* 3*A* (1), 1950 (155–71). 24 refs. P.R.

[Cf. *For. Abstr.* 12 (No. 645).]

2237. BROWN, R. D., DRUMMOND, L. J., LAHEY, F. N., and THOMAS, W. C. **Alkaloids of the Australian Rutaceae: *Acronychia baueri*. II. Some reactions of the alkaloid acronycine. III. The structure of acronycine.** *Aust. J. sci. Res.* 2*A* (4), 1949 (622–9; 630–7). 5 + 8 refs. P.R.

[Cf. *For. Abstr.* 12 (No. 645).]

2238. ROGERS, E. F., KONIUSKY, F. R., SHAVEL, J., JR., and FOLKERS, K. **Plant insecticides. I. Ryanodine, a new alkaloid from *Ryania speciosa* Vahl.** *J. Amer. chem. Soc.* 70 (9), 1948 (3086–8). [Merck & Co., Inc.] O.R.S.

An insecticidal alkaloid, ryanodine, tentatively formulated as $C_{25}H_{35}NO_9$ or $C_{26}H_{31}NO_9$, was isolated from root and stem material of *Ryania speciosa* Vahl. *Authors' summary.*

2239. KUNA, A., and HEAL, R. E. **Toxicological and pharmacological studies on the powdered stem of *Ryania speciosa*, plant insecticide.** *Journal of Pharmacology and Experimental Therapeutics, Baltimore* 93 (4), 1948 (407–13). 12 refs. L.P.S.

2240. HEAL, R. E. **Ryania insecticides.** *Agricultural Chemicals, New York* 4 (5), 1949 (37–9, 89–91). 26 refs. [Merck & Co., Inc., Rahway, N.J.] E.M.B.

A review, with bibliography, of the discovery and development of Ryania insecticides, the principal source of which is the root and stem of *Ryania speciosa*, a species native to Trinidad. Ryania insecticides have given safe and effective control of a large number of agricultural pests [cf. *For. Abstr.* 10 (No. 2961)], particularly the European corn borer.

2241. COLLIER, W. A., and PIJL, L. VAN DER. **Investigations on the antibiotic activity of the leaves of plants on Java.** *Chron. Nat.* 106 (3), 1950 (73–80). [E.] E.M.B.

2242. STOCKER, O. Tiroler Sanddorn (*Hippophae rhamnoides*) als Vitamin C-Höchstleistungspflanze. [***H. rhamnoides* from the Tirol as the highest yielder of vitamin C.**] *Züchter* 19 (1/3), 1948 (9–13). 7 refs. [G.g.] C.G.B.

The berries proved to have the highest yield of vitamin C yet obtained from any plant.

34.26. Resin. Turpentine. Oils. Gums

See also *For. Abstr.* 12 (No. 2519).

2243. MANTELL, C. L. **The natural hard resins—their botany, sources and utilization.** *Econ. Bot.* 4 (3), 1950 (203–42).

2244. GIACOBBE, A. I possibili orientamenti odierni della industria resiniera italiana. **[The possibilities of reorganizing the Italian resin industry.]** *Ital. for. mont.* 5 (6), 1950 (220–9). 16 refs. [It.f.e.]

Reviews modern methods of resin-tapping in other countries and recommends their application in Italy. The author is in favour of compulsory tapping for several years before felling.

2245. ČOKL, M. O pridobivanju borove smole. **[Resin-tapping of Pine.]** *Gozd. Vestn.* 6 (3/4), 1947 (58–65). [Sloven.]

A brief, popular account of the main methods used in Jugoslavia. The German V-shaped face is being introduced on Scots Pine in Slovenia as reducing evaporation losses and maintaining a high quality of turpentine in a dry continental climate. The older method, which adzes a broad face up the stem, is still followed by the peasants in Macedonia and seems suitable for Pines, such as *P. nigra*, that have a more liquid resin.

2246. ČOKL, M. Po prvem letu smolarjenja v Sloveniji. **[The first year of resin-tapping in Slovenia.]** *Gozd. Vestn.* 6 (5/6), 1947 (107–11). [Sloven.]

An illustrated account of the first year's systematic operations, using the German face, on *Pinus sylvestris*. Lack of skilled labour and proper tools, plus prolonged drought, caused a disappointing yield. [Cf. *For. Abstr.* 12 (No. 2929).]

2247. CROKER, T. C. JR. **Wide faces boost gum yields.** *Naval Stores Rev.* 60 (31), 1950 (22–3). [Sth. For. Exp. Sta.]

A comparison of yield from faces of *ca.* 9 in. width in 1948 and that from wider faces (i.e. slightly less than the diameter on trees up to 16 in. in diameter, and *ca.* 16 in. wide on all trees over that size) on the same trees in 1949, showed an increased yield of 58% from the wider faces.

2248. RYBERG, M. E. **Better tools for gum production.** *Naval Stores Rev.* 60 (22), 1950 (14–6, 24). [Lake City Branch, Southeastern Forest Experiment Station.]

Descriptions of the latest types of tool.

2249. PATEL, I. S., and GUHA, P. C. **Indian rosin oil from *Pinus excelsa*.** *Curr. Sci.* 19 (4), 1950 (128–9). 3 refs. A.P.B.

Presents the results of a chemical analysis of oil, dry-distilled from rosin of *P. excelsa*.

2250. VERGHESE, J. **On the carenes in Indian turpentine oil from *Pinus longifolia* Roxb.** *Curr. Sci.* 19 (7), 1950 (212). 5 refs. [Sree Narayana College, Quilon.] A.P.B.

A brief discussion.

2251. PENTEGOV, A. P., and NETUPSKAYA, S. V. Skipidar iz zhivitsy sibirskogo kedra. **[Turpentine from Siberian Pine resin.]** *Dokl. Akad. Nauk SSSR* 71 (1), 1950 (119–22). [Russ.] I.I.E.

Results of tests on 3 specimens showed a turpentine content of *ca.* 20%. The physico-chemical constants of the turpentine are tabulated. Each specimen was fractionated by vacuum distillation. The constants of various components are given. Inactive camphor having normal melting-point was obtained from rectified turpentine by isomerization, etherification, saponification and dehydrogenation.

2252. TOPÇUOĞLU, A. Sığla yağı istihsali. **[Liquidambar production.]** *Orman ve Av* 19 (9), 1947 (169–72). [Turk.]

Cf. *For. Abstr.* 9 (No. 1818).

2253. TOPÇUOĞLU, A. Defne yapragiistihsali. **[Production of Daphne** [*D. oleioides?*] **leaves.]** *Orman ve Av* 20 (6), 1948 (112–3). [Turk.]

A general account of this minor essential-oil industry, hitherto carried on by the peasants, mainly in S. Turkey. The young branches bearing the fresh leaves are cut from June to September (the dry season), air dried for some days in forest clearings, the leaves bagged and baled before export abroad or to local distilleries. The author recommends that production should be controlled by the Forest Service in future.

2254. **Seeds and fruits.** *For. Res. India Burma 1946–47*, 1950 (94).

Preliminary trials showed that it would be possible to extract oil from *Actinodaphne hookeri* seeds in hydraulic presses with heating arrangements.

2255. ARDIKOESOEMA, R. I., and LINDEN, P. J. VAN DER. Gom van kaju djaren (*Lannea coromandelica*). **[Gum from *L. coromandelica*.]** *Rapp. Bosbouwproefsta., Buitenzorg* No. 36, 1950. pp. 6. 4 refs. [Du.Jav.e.]

The gum, which is found in large pieces hanging from the trees, has excellent gluing properties, approximately equivalent, for gluing paper, to gum arabic. It should be dried at 105° C., ground, and then dissolved in 5 to 6 times its volume of hot water. It is difficult to remove small particles of bark. The gum is excreted through insect bore-holes; a better-quality gum might be obtained by tapping. Not all trees produce gum. The timber is unimportant. The tree does not flower in Java but is easily propagated by cuttings.

34.27. Seeds. Fruits. Leaf Fodder

See also *For. Abstr.* 12 (Nos. 2242, 2254).

2256. KAJANOJA, P. Työnmenekistä lehdesten teossa sekä lepän ja koivun lehtien kokoomuksesta ja rehuarvosta. **[Work requirements for gathering leaf fodder, and the composition and feed value of Alder and Birch leaves.]** *Maataloustieteellinen Aikakauskirja, Helsinki* 17 (3), 1945 (101–18). 9 refs. [Fi.e.] A.P.B.

2257. WEST, O. **Indigenous tree crops for Southern Rhodesia.** *Rhod. agric. J.* 47 (3), 1950 (204–17 + 5 plates). 11 refs. [Matopos Research Station.] E.M.B.

Describes *Dichrostachys glomerata*, *Piliostigma thonningii* and 5 species of *Acacia*, all producers of large crops of edible pods suitable for fodder, and presents notes on their characteristics and distribution, and data on the chemical composition and feed value of the pods. It is thought that the larger trees, such as *Acacia albida*, *A. giraffae* and *A. woodii* could be grown on perennial grassland at 4–8 trees/acre, and the smaller trees at 10–20/acre, without damage to the grass yield. At a conservative estimate of one crop every 2 years, the average annual yield of pods would be 1,000–2,000 lb./acre for the large trees, and 250–500 lb./acre for the smaller trees. They should be grown in the habitats to which they are naturally adapted, e.g. *A. albida* on deep alluvial flood-plains in the low veld, *A. giraffae* on deep alluvium and sand in the Gush areas, *A. woodii* on granite sands and other soil types under a fairly high rainfall, *A. litakunensis* on fairly deep soils in valley bottoms in the dry, low veld, *A. subalata* and *P. thonningii* on red soils in medium-rainfall areas, and *D. glomerata* in comparatively frost-free localities in the medium- and low-rainfall areas. Stocking may often be easily effected by selective clearings and thinning of too dense bush. All the species produce good seed which may be planted *in situ* after notching or abrasion, or else germinated in small compost pots which are afterwards planted entire. [Cf. *For. Abstr.* 12 (No. 1876).]

2258. EVERIST, S. L. **Mulga (*Acacia aneura* F. Muell.) in Queensland.** *Queensland Journal of Agricultural Science, Brisbane* 6 (2), 1949 (87–131 + 1 map). 8 refs. [Division of Plant Industry.] O.R.E.

Acacia aneura is described, the most important fodder tree of Queensland, where the most common variety is *A. aneura* var. *latifolia*. Growth forms [cf. *For. Abstr.* 9 (No. 2154)], geographical range, climatic requirements, soils, topography and associated vegetation are discussed in some detail. A life-history of the tree, based on field observations, is also presented. The article concludes with information on the fodder value of the tree, and on methods of utilizing it for fodder, while at the same time maintaining the stands.

2259. SANKARAM, A. **A note on the cultivation of Kapok.** *Indian For.* 74 (11), 1948 [1950] (383–5 + 1 photo). 5 refs.

2260. KIRBY, R. H. **Brush-making fibres.** *Econ. Bot.* 4 (3), 1950 (243–52).

Includes notes on some Palm fibres (piassava, palmyra, coco, kitool, gumati).

34.28. Heather. Broom. Bamboos. Canes

See also *For. Abstr.* 12
(Nos. 1893, 2169–70).

2261. SIMON, G. Pin et genêt. **[Pine and Broom.]** *Rev. for. franç.* No. 10, 1950 (578–84). [F.]

Describes the plantations of Broom (*Sarothamnus* (*Cytisus*) *scoparius* and *Spartium junceum*) made since the war in Charente Maritime, by the Sapotex company, for the production of textile fibres. Improved methods of processing the fibres and extracting, for pharmaceutical use, the sparteine which they contain, have made plantations economically possible and desirable. Large areas of *lande* have been cleared, ploughed, and sown in lines with Broom; a triple row of *Pinus pinaster* is sown every 10 m., and oriented N.–S. so as not to shade the light-demanding Broom. Results so far are excellent, and since the Broom will be cut at frequent intervals, the Pine should be almost completely safe from fire. At 40 years there should be an almost normal stocking of 200 Pines/ha., so spaced as to be easily tapped for resin.

34.3. *Products of the Animal Kingdom*

See *For. Abstr.* 12
(Nos. 1869–70, 2519, 2544–6).

35. SALE AND DISPOSAL OF FOREST PRODUCTS. TIMBER TRADE

See also *For. Abstr.* 12
(Nos. 1700, 1702, 2156–7).

2262. **World outlook and state of food and agriculture 1950.** FAO, Washington D.C., U.S.A. 1950. pp. 31.

Includes short sections on forest products.

2263. MONEY, P. L. **Timber.** Purchasing Officers Association, London. 1950. pp. 12. Price 2*s.* 3*d.* P.R.

A booklet of information, condensed from FAO sources, about world sources of wood supply, with sections on forest areas, main producing areas, world trade and forest products output.

2264. **Timber statistics, including market reports for January–March 1949 and 1950.** *Quart. Bull. Timb. Statist. FAO* 3 (1), 1950. pp. 99. [E.F.]

Cf. *For. Abstr.* 10 (No. 2194).

2265. **Interim report on the European Recovery Programme: Report of the Timber Committee.** Organization for European Economic Co-operation. 3, Sect. 7, [?1949]. pp. 22. [E.] Price 1*s.*

2266. **Seventh report from the select committee on estimates together with minutes of evidence taken before subcommittee F, and Appendices: The timber control.** H.M. Stationery Office, London. 1950. pp. 202. Price 7*s.* 6*d.*

2267. PALOSUO, V. Vuoden 1949 puutavaramarkkinat. **[Review of the development of the timber markets in 1949.]** *Metsät. Aikak.* 1950 (1), (3–5). [Fi.e.]

2268. Skogindustrien i Sverige. **[The timber industry in Sweden.]** *Norsk Skogind.* 4 (9), 1950 (243–7). [Nor.] P.R.

Statistics of production and export.

2269. **An Ordinance to provide for control of the export of timber and its inspection, grading, marking and handling**

in transit. *Suppl.* to *Uganda Gazette* 43 (21), 11 May, 1950 (223–6).

2270. **The export of timber rules, 1950.** *Suppl.* to *Uganda Gazette* 43 (23), 25 May, 1950 (119–27).

2271. Hess, R. W., and Record, M. E. **Foreign wood imports.** *Trop. Woods* No. 96, 1950 (21–36).

A list of vernacular names of timbers currently imported into the U.S.A., with their scientific names and country of origin.

2272. Datos sobre la explotación de la leña y el carbon vegetal. [**Consumption of firewood and charcoal.**] *Agric. venez.* 14 (141), 1950 (42). [Span.] A.P.B.

Presents figures for consumption in Venezuela between the years 1944 and 1949, and discusses the reasons and necessity for a decline in consumption that began in 1947.

2273. Moulds, F. R. **An equated system for the determination of royalty for sawmill logs in Victoria.** *Aust. Timb. J.* 16 (5), 1950 (327, 329, 331, 333, 341–2, 344, 347).

Gives examples of calculating royalty by a system using marketing zones and key market centres, and based on haulage and rail costs.

38. CONSTRUCTIONAL WORKS. ENGINEERING

38.2. *Building Construction. Foundations and Superstructures*

2274. Schrader, O. H. **Douglas Fir plywood for concrete formwork and shuttering.** *Wood* 15 (9), 1950 (300–4).

Examples of the use of plywood for formwork and shuttering in American building practice are described with illustrations, and details are given of standard grades for the different finishes. Advantages of plywood for shuttering are: the smooth, uniformly dense and even-textured surface given to the concrete; the reduction of fins and joints to an absolute minimum by the use of large panels; the workability and high strength/weight ratio of the plywood; and the high degree of re-use possible if panels are stripped, cleaned and stacked carefully.

2275. Gilden, R. O., and Roberts, J. **Building a plywood silo.** *Pap. Bull. Wash. St. agric. Exp. Sta.* No. 198, 1950. pp. 21. P.R.

2276. **Drying of stud timbers in veneer construction.** *Rep. Dep. sci. industr. Res. N.Z.* 1950 (29).

Stud timber in sealed cavities has been found to dry out to less than 28% moisture content in a reasonable time and to remain at this moisture content as long as there is no direct contact with water. There is no need for the excessive ventilation employed in these constructions in recent years.

2277. Perry, T. D. **Uncommon nails.** *Wood Prod.* 55 (10), 1950 (16–20).

Gives data on withdrawal resistance, load capacity and holding capacity of different nails. [Cf. *For. Abstr.* 12 (Nos. 1428–9).]

2278. **Strength of joints.** *Rep. For. Prod. Res. Bd., Lond. 1939–47*, 1950 (62–3).

Nailing tests were carried out on Western Hemlock and on Baltic Redwood using the following nails: standard 12-gauge, 12-gauge blunted, and 14-gauge. The 14-gauge were more effective than the 12-gauge blunted in reducing the splitting of Hemlock, but this was still more prone to split than was the Baltic Redwood using the 12-gauge nail.

38.3. *Road and Bridge Construction*

See also *For. Abstr.* 12 (Nos. 1685, 1918).

2279. McCraw, W. E. **The logger and road building machinery.** *Timber of Canada* 10 (10), 1950 (25–9).

Presents some typical performance figures for 3 types of earth-moving equipment, with estimated costs.

2280. Silvan, L. Metsäautoteiden rakentaminen. [**Building forest lorry roads.**] *Julk., Metsäteho, Helsinki* No. 22, 1949 (17–21). [Fi.e.]

Discusses conditions in Finland and describes the 4 main types of forest roads.

2281. Putkisto, K. Hevostalviteiden hoitokalustosta. [**Maintenance of horse roads in winter.**] *Metsät. Aikak.* 1950 (1), (20–4). [Fi.e.]

Recommendations, following research into the most suitable equipment for Finnish conditions. The more important types (Åmseleplaner and its new version; the Eikka plough; the Arnkil plough-planer and Arnkil snow wall-cutter) are illustrated, and advice is offered on

the tandem harnessing of horses so as to get the maximum tractive effect.

2282. MOUTON, G. Travaux d'entretien en forêt par des procédés mécaniques. [**Maintenance of forest roads by mechanical means.**] *Rev. for. franç.* No. 10, 1950 (544–52). [F.]

An account of the various implements (American graders, disk harrows, bulldozers, wheeled tractors) acquired since the war for making and maintaining extraction and fire-control roads in the forest of Fontainebleau. The time taken to construct 1 km. of such road (harrowing, rolling, grading) is estimated at 1 hr. 28 m. and the cost at 1,125 fr.

2283. HAKKARAINEN, A. E. Maan routaantumisesta tilapäisten talviautoteiden rakentamisen kannalta. [**Soil freezing and the construction of temporary winter truck roads.**] *Julk., Metsäteho, Helsinki* No. 19, 1949. pp. 60. 46 refs. [Fi.fi.e.]

Cf. *For. Abstr.* 11 (No. 1427).

2284. PRATT, R. W. **Design of log span bridges.** *Timberman* 51 (8–11), 1950 (40–1, 50; 92, 94–5; 50, 52, 54; 66, 68, 70–1).

2285. MASANI, N. J. **Simple calculations in the design of forest bridges of stock spans of 15, 20, 30, and 40 ft.** *Indian For.* 76 (8; 9; 10; 11), 1950 (330–42; 383–94; 428–45; 467–86).

38.6. *Drainage*

2286. PLAISANCE, G. Les assainissements en forêts par les moyens mécaniques. [**Draining the forest by mechanical means.**] *Rev. for. franç.* No. 10, 1950 (553–63 + 4 photos). [F.]

Describes experiments in making drainage ditches (1) with a mechanical excavator, and (2) with a double-mouldboard plough. The excavator (a John Allen 12–18 type, caterpillar-mounted, 50-h.p., 7-ton) produced a trench 35 cm. wide and of any desired depth to 200 cm. Its disadvantages were its relative slowness (only 300 m./day on forest ground), its costliness (50 fr./linear m.), and its inability to work contourwise on a slope. The plough, a strong implement with one share and two mouldboards, drawn by a powerful D6 Caterpillar tractor, makes a trench 1·2 m. wide at the top and 0·4 m. at the bottom, and about 0·5 m. deep, at a cost (including previous clearing of brush and finishing by hand) of 24 fr./linear m. The plough, like the excavator, cannot be used contourwise, but the cheapness of the ploughed trenches makes it possible to space them only 10 m. apart, which compensates for that deficiency. Planting is done on the ridges thrown up between the furrows. A plough used in this manner can make 3,000 m. of trench (or cover 3 ha.) in a day.

38.8. *Protective and Erosion Control Works*

2287. SULZLÉE, C. L'étude scientifique de la neige et les travaux de recherche pour la protection contre les avalanches. [**The scientific study of snow and research into methods of protection against avalanches [in Switzerland].**] *Ann. Éc. Eaux For. Nancy* 12 (1), 1950 (233–67 + 1 photo, 4 gphs). 18 refs. [F.]

2288. SULZLÉE, C. Historique des méthodes de construction des ouvrages de protection contre les avalanches. [**History of the methods of constructing protective works against avalanches.**] *Rev. for. franç*, No. 11, 1950 (634–44). [F.]

4. FOREST INJURIES AND PROTECTION

2289. BLUNCK, H. [Editor]. Handbuch der Pflanzenkrankheiten begründet von Paul Sorauer. Vierter Band: Tierische Schädlinge an Nutzpflanzen. Erster Teil. [**Sorauer's manual of plant pathology. Vol. IV: Animals injurious to economic plants. Part 1.**] Paul Parey, Lindenstrasse 44–47, Berlin SW 68. 5th ed. (rev.), 1949. pp. 427. Numerous refs. [G.] Price *DM*38 [£3. 6*s*. 6*d*.] Protozoa to Thysanopteroidea.

2290. DAY, W. R. **Forest hygiene. I. The conception of health and the character of the forest in relation to health.** *Emp. For. Rev.* 29 (3), 1950 (204–10). 21 refs.

Discusses:—(1) the conception of health as applied to the forest; (2) the interplay of the genetical constitution of a species and the living and non-living environmental factors, (3) the conception of the forest as a biocoenosis; (4) the effect on parasites, predators etc. of moving a tree species from its natural environmental range. It is concluded that stability of the forest depends in part on constancy in biotic association.

41. TECHNIQUE OF FOREST PROTECTION

2291. **Conference of FAO: special session Washington, D.C. 3 November 1950. The International Plant Protection Convention and the world reporting service for animal diseases, plant diseases and pests.** FAO, Washington. 1950. pp. 14.

A report prepared for the special session of FAO by a special committee set up to investigate the possibility of establishing a centralized service to report on the incidence of plant diseases and insect pests. The committee reports that before such a central organization could be set up, it would be necessary to have a number of effective regional organizations. A draft revision of the International Plant Protection Convention has been drawn up and is annexed to this report.

2292. DAVIS, E. A. **The wound healing of trees as affected by plant growth regulating substances.** *Proceedings, American Society for Horticultural Science, East Lansing* 53, 1949 (233–8). 7 refs. [Osborn Botanical Laboratory, Yale University, New Haven, Conn.] E.M.B.

Tests were made of the power of cysteine hydrochloride, α-naphthaleneacetic acid, 3-indolebutyric acid, and *o*-chlorophenoxyacetic acid to stimulate wound healing of Sugar Maple. Results suggested that cysteine hydrochloride, which contains the –SH group, might stimulate wound healing. Ortho-chlorophenoxyacetic acid did not accelerate healing to any great extent, but there were some indications that further experiments might prove it to have a stimulating effect; α-naphthaleneacetic acid and 3-indolebutyric acid inhibited wound healing. Cysteine hydrochloride and 3-indolebutyric acid injected into wound overgrowths of *Quercus borealis* did not stimulate cambial activity. It is possible that compounds containing –SH might be of value in stimulating wound healing when incorporated in wound dressings. *From author's summary.*

2293. MCQUILKIN, W. E. **Effects of some growth regulators and dressings on the healing of tree wounds.** *J. For.* 48 (9), 1950 (423–8). 6 refs.

A series of 11 studies dealing with treatments to promote healing of tree wounds is described. The treatments involved several substances used as dressings, with and without incorporation of growth-regulator and other chemicals. Other variables were tree species, soil fertilizer applications, season of wounding, intensity of wounding, orientation and shading of wounds, and kinds of wounds. Altogether, 13,560 wounds, distributed over 646 trees representing 10 species, were made and observed. None of the growth-regulator or other specific chemicals significantly increased the rate of wound healing in any tree species. Dressing the wounds with lanolin promoted healing by preventing drying and die-back, thereby allowing callus to form promptly at the wound edges. The physical properties of lanolin dressings were improved by incorporation of rosin and Pine gum. Good healing also occurred in wounds painted with shellac and overcoated with plastic asphaltum. Shellac alone was ineffective in promoting healing.

As a dressing, Bordeaux paste was inferior to both lanolin and shellac plus asphaltum.

The tree species varied greatly in rates of healing and susceptibility to die-back from wound edges. Of the 10 species used in these experiments, White Oak was the fastest healer and Virginia Pine was the slowest. Red Maple wounds were often long in closing because of excessive die-back. Within a species, rate of healing seemed to be correlated with tree vigour. Healing rates were significantly increased in White Oak by applications of fertilizer to the soil. Except on Red Maple, wounds made in late winter or early spring healed faster than those made at other seasons. Because of excessive bleeding in early spring, wounds on Red Maple healed best if made in late spring or early summer.

Callus sometimes developed directly on wound faces from ray cells or fragments of cambium. Attempts to induce the regular formation of such callus were unsuccessful. Pruning wounds and wounds on the clear bole healed and responded to treatments in much the same manner, except that pruning wounds tended to heal somewhat more slowly. Three seasons after boring, most increment-borer wounds on six hardwood species were closed externally, but no treatment tested had been effective in preventing discoloration of the wood. Not enough time had yet elapsed since boring to reveal correlations, if any, between treatments and wood decay. *Author's summary.*

2294. CHADWICK, L. C., and NANK, E. E. **The effects of certain pruning practices and wound dressings on callusing of tree wounds.** *Proceedings, American Society for Horticultural Science, East Lansing* 53, 1949 (226–32). 7 refs. [Ohio State University, Columbus, Ohio.] E.M.B.

An average of 12 branches was removed from each of 13 trees of *Ulmus procera*, giving a total of 160 wounds from 2 to 12 in. diameter. Three commercial tree paints, Bordeaux, linseed oil, and orange shellac were used as wound dressings. Wounds treated with orange shellac callused the most, and those with one of the commercial dressings, Sav-a-tree, the least rapidly. Small wounds produced more callus per sq. in. than large ones. Wounds made by removal of limbs growing at right angles to the trunk callused more rapidly than those from limbs at acute angles. Wounds facing S. and S.W. callused more rapidly than those facing N. and N.W., those facing in other directions were intermediate in rate of healing. The rate of callusing increased with the height of the wound on the trunk. Wounds on healthy trees callused more rapidly than those on poor specimens. Whether the dressing was applied immediately or after 1–7 days, did not appear to influence the rate of callusing. There appeared to be no advantage in applying a temporary dressing of orange shellac, to be followed by a more permanent dressing.

2295. WENZL, H. Die Prüfung von Baumpflegemitteln nach der Wundhälftenmethode. **[Testing tree-dressing materials by means of the 'half-wound' method.]** *Pflanzenschutzberichte, Vienna* 3 (7/8), 1949 (112–6). [G.g.e.] I.I.E.

In testing the worth of tree-dressing materials encouraging the formation of wound tissue, treatment of pruning wounds along only ½ of the cut (in the horizontal direction) and comparing the 2 halves gave good results, while requiring only a small number of tests.

42. INJURIES FROM INORGANIC AGENCIES, EXCLUDING FIRE

42.2. *Temperature Influences*

See also *For. Abstr.* 12 (Nos. 2355, 2459).

2296. MINDERMAN, G. Een mogelijke oorzaak van het 'ruien' van fijnsparren. **[A possible cause of the 'moulting' of Spruce.]** *Ned. Boschb.-Tijdschr.* 21 (5), 1949 (137–9). 2 refs. [Du.]

Characteristic breaks of Spruce twigs are described, in which jagged pieces of bark form a 'crown' encircling the broken surface of the wood. They differ from breaks made by squirrels or wind. Experiments in a refrigerator show that at about – 5° C., twigs become very brittle and break easily in the characteristic manner described. Photographs are given showing the natural and induced form of the break.

42.3. *Precipitations*

2297. PARKER, J. **The effects of flooding on the transpiration and survival of some**

southeastern forest tree species. *Plant Physiol.* 25 (3), 1950 (453–60). 6 refs. [Duke University, Durham, N.C.] O.R.E.

A study was made on potted seedlings of various hardwood and softwood species to discover the injury caused to roots by flooding, as measured by decreases in transpiration rates. Results are given graphically. Substantial similarity between the species in reduction of transpiration rates was shown. *Juniperus virginiana*, *Quercus borealis* var. *maxima*, *Pinus taeda*, *Q. alba* and *Q. prinus*, all responded similarly. *Taxodium distichum* showed an outstandingly high level of transpiration rate after flooding. *Q. lyrata* showed a decline similar to the other Oaks in the first few days of flooding, but, unlike them, produced a second crop of leaves. Leaves of *Cornus florida* died shortly after flooding in one experiment, but died only after 3 weeks when the experiment was repeated.

2298. WILDE, S. A., YOUNGBERG, C. T., and HOVIND, J. H. **Changes in composition of ground water, soil fertility, and forest growth produced by the construction and removal of beaver dams.** *J. Wildlife Mgmt.* 14 (2), 1950 (123–8 + 1 plate). 5 refs. [University of Wisconsin.] B.A.P.

Areas selected for investigation in Wisconsin had been flooded for some time (5–11 years in some cases) before drainage was effected by destruction of dams. Time elapsed since drainage varied from 2 years to 3 or more decades. On coarse sandy soils *Carex* spp. and related marsh plants were replaced after a few years by Aspen [*Populus* sp.] and Paper Birch [*Betula papyrifera*]. On peat or muck soils, however, sedge meadows may resist forest invasion for several decades. Plant succession on clay soils occupied an intermediate position between the two. A chemical study of surface and ground water showed oxygen deficiency and a low oxidation/reduction potential in the latter, an indication that drainage had been only superficial. Analyses of several organic and mineral soils that had been submerged longer than 5 years show that the effect of de-oxidation is to saturate the soil with H_2S, which, acting on the ferric compounds, enriches the soil with soluble ferrous iron. This in its turn leads to the fixation of P in an insoluble form. The effects of hydrolysis are shown in the extremely low base exchange capacity in mineral soils. Nursery experiments showed that the formation of mycorrhizae is inhibited on seedlings raised in previously flooded soils. The rapid change in groundwater level induced by sudden drainage invites drought injury and decreases the growth of affected forest stands in both upland and lowland sites. It seems better therefore to prevent the settlement of beaver colonies in undesirable sites, rather than to remove established dams. On peat and muck soils it may even be advisable to maintain the dam after the beaver colony has been removed.

2299. **Type of thinnings *vs.* glaze damage in plantations.** *Pa. For. Wat.* 2 (4), 1950 (86–7). 2 refs.

Sample plots for study of different degrees and methods of thinning were established in 1949 in a 28-year-old Red Pine [*Pinus resinosa*] plantation originally spaced 6 × 6 ft. A severe glaze storm in Feb. 1950 gave a good opportunity to correlate glaze damage with types of thinning, with results as follows:—

Method of thinning	*No. of trees/ acre remaining after thinning* 1949	*No. of crop trees marked*	*No. of trees felled by glaze storm* 1950
Crop tree method*	1,000	225	0
Every 3rd row cut	780	165	0
Only crop trees remaining	265	265	45
No trees cut	1,100	270	0

* The 'crop tree method', employed in all State plantations, consists in selecting *ca.* 150 of the best trees per acre and liberating their crowns on one side only.

42.5. *Chemical Influences. Nutrient Deficiencies*

See also *For. Abstr.* 12 (Nos. 2330–1).

2300. **'Fused needle' in Pine trees.** *Rep. Dep. sci. industr. Res. N.Z.* 1950 (74).

'Fused needle' occurs in Pine trees in the Athenree district. The content of HCl-soluble phosphate in the soil is comparable to that in Queensland soils where a similar disease

occurs and is remedied by the application of phosphate. [Cf. *For. Abstr.* 8 (No. 658).]

2301. HINKLE, D. A., and EISENMENGER, W. S. **Chloroplast pigments in relation to magnesium deficiency.** *Soil Sci.* 70 (3), 1950 (213–20). 6 refs. [Massachusetts Agricultural Experiment Station.]

A study of the effects of Mg deficiency upon the chlorophyll, xanthophyll and carotene content of leaves of various plants, including Oak [*Quercus* sp.]. Mg deficiency causes not only a loss of chlorophyll in the lower leaves, but also a loss of xanthophyll and carotene. *From authors' summary.*

2302. GUSTAFSON, F. G. **Is the American Elm (*Ulmus americana*) injured by natural gas?** *Plant Physiol.* 25 (3), 1950 (433–40). 2 refs. (*Paper, Department of Botany, University of Michigan* No. 896.) O.R.E.

Young Elms were planted in wooden tubs in porous soil through which a mixture of natural illuminating gas and air was passed. The treatment was continued for several seasons except during winter, when, it was assumed gas could not pass through frozen soil. It was found that concentrations of 2·5–4% gas in air cause some injury to roots and hinder their development, but this does not seem to affect the growth of the stem.

43. FOREST FIRES

See also *For. Abstr.* 12 (No. 1914).

43.0 *Predisposing Factors and Causes*

2303. ROY, L.-A., ST.-AMANT, L., and VERRET, M. Les dangers d'incendie forestier en 1949. [**Forest fire danger [in Quebec] in 1949.**] *Bull. Serv. Prot. Québec* No. 18, 1950. pp. 8 + 6 dgms., 19 gphs., 3 tbls. [F.]

The authors have analysed the indices of flammability for each region of the province for a whole fire season (May–October). These indices, based on observations made at 104 meteorological stations, are computed by the Wright-Beall method. From the regional indices, an index for the whole province has been compiled. [Cf. *For. Abstr.* 10 (Nos. 2218–9).]

43.1. *Protective Measures (including controlled burning)*

See also *For. Abstr.* 12 (Nos. 1963, 2261, 2458, 2519, 2530).

2304. ŽAGAR, B. O gozdnih požarih. [**On forest fires.**] *Gozd. Vestn.* 7 (2), 1948 (36–49). [Sloven.]

A general account of the causes and types of forest fire, methods of control (with diagrams and a note on official prescriptions) and the regeneration of burnt areas. Some account of damage sustained since 1945 is also given.

2305. Splošni zakon o varstvu gozdov pred požarom. [**General law on the protection of forests against fire.**] *Gozd. Vestn.* 7 (2), 1948 (53–7). [Sloven.]

2306. ALLOUARD, P. La lutte contre les incendies de forêts dans les pays tropicaux: examen de l'expérience acquise au Cambodge. [**The fight against forest fires in the tropics: examination of experience gained in Cambodia.**] *Rev. int. Prod. colon.* Nos. 251/2; 253, 1950 (151–6; 77–80). [F.]

Particularly emphasizes the social and economic problems involved in the control of brush fires, and urges that detailed studies should be made on large units of 10,000–30,000 ha. with populations of 500–3,000.

2307. RENDALL, R. E. **Forest-fire hazards.** *Journal of the New England Water Works Association, Boston, Mass.* 62 (2), 1948 (160–3). L.S.

As a result of serious fires in Maine forests in 1947, recommendations are made for organizing and training fire-fighters, providing equipment, and educating the public.

2308. REYNOLDS, R. D. **Fire protection law enforcement trends in California.** *J. For.* 48 (10), 1950 (696–9). 8 refs.

In the Los Angeles city and the Redwood area of California, the collection of fines for infringement of fire-protection laws is in the hands of a specially trained officer who combines this task with the education of delinquents in the principles of protection. This is said to be very effective and has the advantage of relieving ordinary forest officers of the odium of fine-collection.

2309. SOMES, H. A., and MOORHEAD, G. R. **Prescribed burning does not reduce yield**

from Oak-Pine stands of southern New Jersey. *Sta. Pap. Ntheast. For. Exp. Sta.* No. 36, 1950. pp. 19. 7 refs.

Results of two studies on the effect of prescribed burning are tabulated. Mortality of Pitch and Shortleaf Pines was limited to stems of 1 in. d.b.h. or less. The average increase of mortality in Pines of all ages was 9%. The mortality among Oaks of 1 in. d.b.h. or less considerably exceeded that of Pines, but there was again little increase in mortality among trees larger than 1 in. d.b.h. Basal wounds on Pines were usually smaller and less numerous than on Oaks. There was much less basal wounding in thinned than in unthinned stands.

2310. AGRA, Y. ***Pistacia lentiscus* as a forest fire resistant.** *Forest, Palestine* No. 2, 1950 (37, Suppl. 7). [Heb.e.]

The author noticed, during forest fire fighting in Western Galilee, that this bush does not catch fire, even when surrounded by burning thorns; only the very ends get charred, while the centre continues green. He ascribes this to its dense foliage retaining much water and preventing draught, and suggests introducing it on firebreaks, where the rock soil makes eradication of thorns and grass difficult; under *P. lentiscus* no vegetation would develop.

2311. BURKE, J. P. **Use of aircraft in control of lightning fires on Black Hills National Forest.** *Fire Control Notes* 11 (4), 1950 (10–2).

A review of the last 5 fire seasons showed that 74% of the fires in this forest were caused by lightning. Aerial detection is now used to supplement lookouts. The lookouts report approaching electric storms and maintain a record of the path of the storms and of individual strikes. If the fire danger justifies such action, a plane is sent out in time to follow the storm into the forest, and it stays on the job as long after the storm has passed as conditions warrant. When forest fuels have had a chance to dry sufficiently to stimulate dormant fires to activity, the plane is sent out again. The methods and organization of communication are described. The present technique results in considerable saving, particularly in the control of lightning fires, and consequently no great expansion of the present lookout system is contemplated.

2312. FONS, W. L. **Wet water for forest fire suppression.** *For. Res. Notes Calif. For. Range Exp. Sta.* No. 71, 1950. pp. 5.

Preliminary report on a research programme being carried out at the University of California. Conclusions drawn from work so far done are as follows:—(1) Savings up to 23% in the volume of water required and 13% in time of mopping up can be obtained with wet water if applied with reasonable efficiency. (2) Re-kindling is reduced by as much as 30% in fires mopped up with wet water as compared with plain water. (3) Foaming appears to be a desirable property of wet water because it prevents the water from running away. (4) Wet water is markedly superior to plain water in its ability to knock down flames quickly, thus permitting access to a fire edge not otherwise accessible. (5) Dead fuels remain wet up to 50% longer when sprayed with wet water than with plain water. (6) Fuels once treated with wet water and allowed to dry may be sprayed later with plain water with results comparable to an original spraying with wet water. (7) Most wetting agents increase the corrosive action of water, but this can be corrected by the addition of chemical corrosion-inhibitors. [Cf. *For. Abstr.* 9 (Nos. 1879, 2532); 11 (No. 638); 12 (No. 690).]

2313. **New twist: 'bombing' fires.** *Timber of Canada* 10 (12), 1950 (32–3, 57).

Successful trials in the new technique of 'bombing' forest fires from the air with bags of water were recently held at Sault Ste. Marie, and field tests are planned by the Ontario Department of Lands and Forests. The water-bombing method is designed for attacking small fires as soon as they are spotted by the patrolling plane, in order to confine them to as small an area as possible, while the ground crews are approaching them. Containers used in the tests were specially modified cement bags with an additional layer of water-proofed paper, each bag containing about 5 gal. water. About 10 bags were carried in each plane. A special release chute was built through the hole normally used for the survey camera in the aircraft. By operating a trip-cord the pilot was enabled to drop as many as 3 bombs at a time. Height is an important factor. Results are much more accurate if the bombs are dropped from a height of under 150 ft. above tree-top level. Above 150 ft. special

sighting apparatus and specially shaped water-bags are necessary for real accuracy. When dropped from 100 ft. the bags had enough forward motion to cut a swath through grass or weeds in front of the fire and so create a fire-break and wet it down at the same time. [Cf. *For. Abstr.* 11 (No. 1440).]

2314. MARUELLE. Les contre-feux et la tactique en matière d'incendie de forêts. **[Counter-fires and tactics in forest fire control.]** *Sécurité et Prévention du Feu, Paris* 5 (5/6), 1949 (88–92). [F.] D.S.I.R.

Discusses the pros and cons of using counter-fires, with a final conclusion strongly against, on both scientific and practical grounds. Water alone should be the weapon of control.

2315. **Effects of altitude, length of hose line and head on performance of forest fire pumping units.** *For. Fire Res. Note For. Br. Can.* No. 13, Suppl. 2, 1950. pp. 12.

Cf. *For. Abstr.* 9 (No. 1880).

43.2. *Fire Insurance*

2316. WRIGHT, W. G. **Forest fire insurance.**—With comment by H. B. Shepard of the Federal Reserve Bank of Boston. *J. For.* 48 (8), 1950 (345–50).

Some time ago a number of limitholders in the Province of Quebec expressed a desire for insurance of standing timber against fire loss, and a considerable amount of work has been done towards providing this class of insurance. The purpose of this article is to discuss the more important of the questions that have been raised by the limitholders, and if possible to promote a more general acceptance of the idea that standing timber can be insured at reasonable cost once certain conditions are fulfilled.

43.3. *Fire Damage*

See also *For. Abstr.* 12 (No. 2309).

2317. **Forest fire losses in Canada 1949.** For. Br. Can. 1950. pp. 7 + 5 tbls.

For the first time, statistics for Newfoundland are included, and the report is published separately.

44. DAMAGE BY HARMFUL PLANTS VIRUS DISEASES

44.1. *Forest Weeds*

See also *For. Abstr.* 12 (Nos. 1667, 1940).

2318. AL'BITSKAYA, M. A., and BEL'GARD, A. L. O vzaimootnosheniyakh drevesnokustarnikovoy i travyanistoy rastitel'nosti v iskusstvennykh lesakh Dnepropetrovshchiny. **[The mutual relations of trees and shrubs with herbaceous vegetation in artificial stands in the Dnepropetrovsk region.]** *Bot. Zh. S.S.S.R.* 35 (3), (225–32). 5 refs. [Russ.] [Kafedra Geobotaniki, Dnepropetrovski Gosudarstvennyy Universitet.] P.R.

Describes the herbaceous vegetation associated with various hardwood stands (Oak, Ash, Robinia, Gleditsia, pure or in mixture, of varying density and with or without a shrub layer) on chernozem soils in the Dnepropetrovsk steppe region, with special reference to the prevention of invasion by steppe weeds, concluding that: (1) Stands giving dense shade are necessary to exclude such weeds. (2) A shrub layer should be introduced into the more open stands that can still be saved. (3) Dying stands, where weed invasion has gone too far already, must be replaced by stands of more suitable species and structure. (4) Sources of weed seeds such as rides, ditch-sides etc., should be mown before the weeds flower. (5) At borders of woods it would appear useful to create live barriers of shrubs such as *Elaeagnus* and *Caragana* which, according to the authors' observations, help to keep out weeds. [Cf. *For. Abstr.* 12 (Nos. 1986–7).]

2319. HORTON, J. S. **Effect of weed competition upon survival of planted Pine and chaparral seedlings.** *For. Res. Note Calif. For. Range Exp. Sta.* No. 72, 1950. pp. 6.

The species studied (San Dimas Experimental Forest: average annual rainfall 28 in.) were *Pinus coulteri*, *Quercus dumosa*, *Ceanothus crassifolius*, and *Adenostoma fasciculatum*. The herbaceous growth that covered the area had been undisturbed for 4 years and consisted mainly of annual species. Results showed that the presence of weeds reduced survival of all species. The first year appears to be the critical one in determining survival. The fact that most of the Pine losses occurred during the dry late summer and autumn, suggests that competition for water between Pine and weeds

was probably the causative factor. It is concluded that under conditions of summer drought, good survival of planted stock is dependent upon the removal (at least during the first season) of competing annual grasses and herbs.

2320. KOPPIKAR, V. B. **Some observations on mixed planting of *Ocimum kilimandscharicum* (camphor-yield Tulsi plant) and young Teak.** *Indian For.* 76 (9), 1950 (405).

Seedlings of *O. kilimandscharicum* were planted (*a*) between nursery lines of Teak, and (*b*) parallel to and between Teak stumps at a distance of 1½ ft. and 2 ft. respectively. In both cases the Teak leaves wilted and fell prematurely, and the height of interplanted Teak stump plants a year later was 6–13 in. compared with 24–60 in. for controls. It is suggested that the highly aromatic *Ocimum* has a toxic effect on very young Teak.

2321. HOY, J. M. **Control of Manuka by blight.** *N.Z. J. Agric.* 79 (4), 1949 (321–4). A.P.B.

An *Eriococcus* species found in New Zealand attacks and often kills Manuka (*Leptospermum scoparium*) and attacks but rarely kills Kanuka (*L. ericoides*). When Manuka is 10–15 ft. high, no quick kill can be expected from introducing *Eriococcus*; it seems probable that at least 5 years elapses between the original infestation and the death of the plant. The most effective method of infecting plants is to tie infested twigs, between May and September when crawlers are present, at the base of the plant to be infected. The only effective control of *Eriococcus* established on Manuka is by burning the infested area. Where Manuka is being killed in steep country, spaced planting with Willow or Poplar or afforestation with *Pinus radiata* to prevent erosion is recommended. If *Eriococcus* becomes established in a thick stand of Manuka constituting a nurse crop for tree seedlings, honeydew falling from the mealybugs on to the leaves of the trees will cause the growth of a black fungus; this will not harm quick-growing tree species but is likely to affect slow-growing ones.

2322. **Danger seen in propagation of Manuka blight.** *N.Z. J. Agric.* 80 (4), 1950 (337). A.P.B.

Summarizes the findings of a committee meeting under the auspices of the Soil Conservation and Rivers Control Council. It was decided that:—(1) Manuka serves a useful purpose as a soil conserver and aid to forest regeneration on poor soils, (2) good farming gives the most effective control, (3) the artificial propagation of a plant disease about which so little is known, is dangerous, and (4) widespread distribution of the disease is likely to prove disadvantageous to the country in the long run. [Cf. *For. Abstr.* 12 (No. 1563).]

2323. WOODFORD, E. K. **Experimental techniques for the evaluation of selective herbicides.** *N.A.A.S. quart. Rev.* No. 9, 1950 (1–10). [Department of Agriculture, University of Oxford.] O.R.E.

A brief account of some of the important principles basic to this type of investigation.

2324. MUKULA, J. **On eradication of woody plants with herbicides in fields and pastures.** *Maataloustieteellinen Aikakauskirja, Helsinki* 22 (1), 1950 (1–21). 27 refs. [E.e.fi.] A.P.B.

Experiments for destroying woody plants in fields and pastures were made in 1948–9 with the following substances applied as aqueous solutions or emulsions: Na salt of 2M-4K (Agroxone, Akodrin, P46 and Weedone), Na salt of 2,4-D (Hormoxol), morpholine of 2,4-D (Hormoxol), triethanolamine of 2,4-D, butyl ester of 2,4-D, ethyl ester of 2,4-D (Weedone), $KClO_3$ (Fekabit) and NH_4 salt of dinitro-*o*-cresol (Trifoblock). Three methods were tested—spraying the foliage, absorption through a cut branch, and application to the soil, on *Alnus incana*, *Salix* spp., *Betula* spp., *Sorbus aucuparia*, and *Populus tremula*, thicket-forming woody plants common in Finland. The following conclusions have been drawn from the experiments:—

It is possible to destroy small sprouts (0·5–1·5 m. high) of these plants by spraying their foliage with growth regulators in early summer. Treatment is most effective if given in warm, sunny weather, and best results are secured by spraying towards the end of June or at the beginning of July. Of the substances tested, esters of 2,4-D proved the most effective in spray applications, but the other growth regulators were also satisfactory. For different

species of woody plants the necessary concentration of the solution varies from 0·1 to 0·4% of the active substance. For dense thickets, 0·5–1·5 m. high, the amount of solution used was 1,250–2,000 l./ha. applied by means of knapsack pressure sprayers. A second control spraying should be carried out after 2–3 weeks. Spraying with Fekabit and Trifoblock kills leaves but does not prevent resprouting.

Application of aqueous solutions of growth regulators to cut branches will kill relatively tall Alders and their roots, but is effective with the other species only if made to several branches. The necessary amount of substance for killing even Alder is, however, so great that this method cannot be recommended for general practice. Application of the above-mentioned substances to the soil does not achieve satisfactory results at reasonable cost.

2325. DAVID, R. Contribution à l'étude du débroussaillement chimique. **[Contribution to the study of the chemical destruction of weeds and shrubs.]** *Bois & Résin.* 32 (1531), 1950 (1). [F.]

[For earlier report cf. *For. Abstr.* 11 (No. 2254).] Further experiments confirmed previous results. A new commercial preparation 'Weedone Anti-Ronces', 'containing a substance akin to 2,4-D' gave even better results than the 2,4-D preparations. Heather sprayed with an 0·75% concentration of this substance in March appeared to be dead and had not resprouted at the time of writing (July), whilst grasses were uninjured.

2326. HOUGH, A. F. **Weed killers may be useful in reforesting old burns.** *Ntheast. Res. Note Ntheast. For. Exp. Sta.* No. 1, 1950. pp. 4.

A preliminary study showed that 2,4-D, G,652 (methyl ester of 2,4-D) and common salt were ineffective in killing weeds. Results indicated that Ammate (ammonium sulphamate) applied as spray at the height of the growing season may be useful for preparing planting sites and reducing competition for at least 2 seasons. Test trees of Red Pine and Black Locust planted on sites treated with Ammate did not appear to be affected by toxicity in the soil. Costs are at present excessive—$50 per acre at a concentration of 1 lb./gal., applied at a rate of 435 gal. per acre.

2327. **Defoliation of bush for tsetse control.** *Colon. Res., Lond. 1949–50,* 1950 (135).

It has been considered that if it were possible partially to defoliate the bush in tsetse concentration areas during certain periods of the year, this might assist in the control of the fly, by making its habitat untenable. Following a number of small trials in Kenya from the ground with various compounds having a phytotoxic effect, strips of bush on an island in Lake Victoria were sprayed from the air with 2,4-D and 2,4,5-T at the rate of 2–4 lb. in 3 gal. oil/acre. From air observation it appears that the foliage of the top canopy has been killed, but it seems that there was little, if any, penetration.

2328. SCHUBERT, G. H. **Control of sprouting of Tanoak and Madrone stumps.** *For. Res. Notes Calif. For. Range Exp. Sta.* No. 74, 1950. pp. 2.

Stumps of Tanoak (*Lithocarpus densiflora*) and Madrone (*Arbutus menziesii*) were drenched with a 1% solution of the isopropyl ester of 2,4-D; stumps smaller than 6 in. in diam. received ½ pint and those larger 1 pint of solution. Proportions of treated and untreated stumps bearing sprouts were respectively, for Madrone 28 and 96%, for Tanoak 64 and 100%. Numbers of sprouts on treated and untreated stumps averaged 6 and 19 for Madrone, and 19 and 45 for Tanoak. Season of treatment had little effect on control of sprouting and there was no correlation between diameter of stump and sprouting.

2329. GLENDENING, G. E., and PAULSEN, H. A. **Recovery and viability of Mesquite seeds fed to sheep receiving 2,4-D in drinking water.** *Bot. Gaz.* 111 (4), 1950 (486–91). 9 refs. O.B.D.

Experiments were made by the Southwestern Forest and Range Experiment Station in co-operation with the University of Arizona Agricultural Experiment Station, to find whether germination of *Prosopis juliflora* var. *velutina* seeds disseminated in the droppings of sheep, and the growth of the resultant seedlings, were affected when 2,4-D was added to the drinking water of the sheep at a concentration of 100 p.p.m. Of the 5,950 seeds fed to two sheep, 68% were destroyed by the digestive processes, and 27·3% were immediately or potentially viable. The presence

of 2,4-D had only a slight effect on total germination of the eliminated seeds, because the bulk of viable seeds retain their impermeable seed-coat even after passing through the alimentary tract.

2330. LOCKE, S. B. **2,4-D injury to shade trees in the Palouse area.** *Plant Dis. Reptr.* 34 (5), 1950 (150). A.P.B.

A note on damage to shade trees after aeroplane spraying of wheat fields.

2331. BROWN, J. G. **Persistence of 2,4-D in plant tissues.** *Plant Dis. Reptr.* 34 (5), 1950 (127). 2 refs. [Arizona Agricultural Experiment Station.] A.P.B.

The ester form of 2,4-D in a concentration of 2 tablespoonfuls per gal. was applied in late autumn to a lawn in Arizona in which trees of *Melia azedarach* were growing. Abnormalities were noticeable in leaves appearing in the following spring, some having only vestiges of leaflets. Chlorosis also was marked. The author believes that persistence of 2,4-D in the vegetative tissues is responsible. [Cf. *For. Abstr.* 12 (No. 699).]

44.2. *Parasitic (Higher) Plants*

2332. PLAGNAT, F. Le gui du sapin. **[The Fir Mistletoe, *Viscum album* f.sp. *abietis*.]** *Ann. Éc.Eaux For. Nancy* (12) (1), 1950 (155–231 + 1 map). 32 refs. [F.]

A detailed study of the distribution of Mistletoe on *Abies alba* in France, where all stands are more or less infested except those in Normandy. The ecological factors are discussed. The author holds that aspect has no direct influence on degree of infestation, that the apparent influence of altitude is in fact connected with temperature, and that the determining factors are warmth and illumination, which are essential to the growth and spread of the Mistletoe. In dense stands, the parasite is confined to the tops of the crowns where it does comparatively little harm, but any opening due to windthrow, injudicious thinning etc. gives it an opportunity to spread to the trunk. The urgent need for further study and the adoption of a vigorous policy of control are emphasized. [Cf. *For. Abstr.* 8 (No. 1403).]

2333. PLAGNAT, F. Sylviculture des sapinières à gui. **[Silviculture in Fir stands infested with Mistletoe.]** *Rev. for. franç.* 1950 (7/8), (365–78 + 6 photos). 16 refs. [F.]

The biology, distribution in France, and control of *Viscum album* f.sp. *abietis*, are discussed. Chief methods of control when the Mistletoe is well established are removal of heavily infested trees, and shortening of the felling cycle. Preventive methods include: felling at an average diameter of 45 cm. rather than 60 cm.; shorter felling cycles; removal of wind-thrown trees, and rigorous control of bark-beetles; and an increased use of mixed stands. Among the species recommended are: Spruce, Larch, Scots Pine, Beech, Maple, Lime and Chestnut. Recommended proportions are: (1) up to 800 m., Fir 30%, other conifers 30%, broad-leaved species 40%. (2) 800 m. to the upper limit for Mistletoe, Spruce 45%, Fir and other conifers 25%, broadleaved species 30%.

2334. WRABER, M. Vzroki hiranja jelke na Logaški in Rakitniški planoti. **[Causes of decadence of Silver Fir [*Abies alba*] on the Logatec and Rakitna plateau.]** *Gozd. Vestn.* 7 (8), 1948 (201–3). [Sloven.]

Silver Fir is predominant in parts of the Karst region of Slovenia, where the natural conditions suit it, but it checks at the age of 40–50 years and shows signs of disease—canker, decay, and *Viscum abietis*. This, it has been shown, is due to the rocky, dolomitic substratum, impenetrable to roots, underlying the 15–30 cm. of fertile humus. A rotation of 50 years, giving diameters of 35–40 cm., is recommended for such forests.

44.3. *Fungi and Bacteria*

See also *For. Abstr.* 12 (Nos. 1770, 1825–7, 1874–5, 1880, 1885, 2334, 2382, 2463, 2504).

2335. DOWSON, W. J. **Manual of bacterial plant diseases.** Adam & Charles Black, London. 1949. pp. 183 + 54 photos. Many refs. Price 16*s*.

2336. McCUBBIN, W. A. **Plant pathology in relation to federal domestic plant quarantines.** *Suppl.* to *Plant Dis. Reptr.* No. 191, 1950 (67–91) 58 refs. A.P.B.

Includes notes on quarantine regulations in the U.S.A. and the spread of Chestnut canker (*Endothia parasitica*), Dutch Elm disease (*Ceratostomella ulmi*), Larch canker (*Dasyscypha wilkommii*), White Pine blister rust

(*Cronartium ribicola*) and Woodgate rust (*Peridermium* sp.).

2337. HEPTING, G. E., and TOOLE, E. R. **Some southeastern tree diseases—1948 and 1949.** *Plant Dis. Reptr.* 34 (5), 1950 (135–7). A.P.B.

A list of tree diseases investigated by the Asheville, N.C., office of the Division of Forest Pathology in 1948 and 1949.

2338. MILLER, J. H. **A historical sketch of diseases of forest trees in Georgia.** *Suppl.* to *Plant Dis. Reptr.* No. 191, 1950 (98–101). 45 refs. [University of Georgia.] A.P.B.

2339. CARRERA, C. J. M. La 'enfermedad de los almácigos' de las coníferas en la república argentina. Estudio de los agentes causales. **[Damping-off of conifers in Argentina. Study of the pathogens.]** *Abstr.* in *Idia* 2 (24), 1949 (11). [Span.] C.G.B.

Of the fungi isolated, *Fusarium arthrosporioides* was new both on Pine [*Araucaria*] and in Argentina, and *F. gramineum* and *F. avenaceum* were new on Pine.

2340. TAMOLANG, F. **Control of *Rhizoctonia* damping off of Agoho (*Casuarina equisetifolia* Linn.) by soil treatment and by special growing media.** *Philipp. J. For.* 6 (2), 1950 (229–38). 10 refs.

ZnO applied to the soil before and after the emergence of the seedlings was most effective in controlling post-emergence damping off. Less effective, but appreciable, control was also given by a 1 : 80 dilution of H_2SO_4, 1 : 75 formaldehyde, and 1 : 10 vinegar. Steam heating of the soil under pressure gives the most effective control of pre-emergence infection. Pure fresh sawdust and red sand as germination media are not entirely safe from infection. A mixture of red sand and wood ash possesses a toxic quality that simultaneously reduces germination and prevents damping off. *From author's summary.*

2341. HARTLEY, C., and DAVIDSON, R. W. **Wetwood in living trees.** *Abstr.* in *Phytopathology* 40 (9), 1950 (871).

Discusses the occurrence and causes of wetwood, and cites some fresh species in which this condition has been found.

2342. HEPTING, G. H., and ROTH, E. R. **The fruiting of heart-rot fungi on felled trees.** *J. For.* 48 (8), 1950 (332–3).

A study was conducted by the U.S.D.A. Division of Forest Pathology and the Southeastern Experiment Station, to determine the extent to which new fruiting bodies will form after trees affected by heart rot have been felled and the existing fruiting bodies knocked off. Observations were made over a series of years on 63 trees of various species of Pine, Black Locust, Red Maple and several species of Oak. It was found that trees bearing fruiting bodies of several species of *Fomes* produced new fruiting bodies as numerous as the original ones, up to 5 years after felling, but fruiting practically ceased between 10 and 15 years after felling. *Polyporus* spp. regenerated only one-fourth as many new fruiting bodies at 5 years after felling as were on the trees originally, and all fruiting ceased before the 10th year. It is concluded that the felling of such trees is a good sanitation measure even if the trees cannot be utilized or burned.

2343. RISHBETH, J. **Observations on the biology of *Fomes annosus*, with particular reference to East Anglian Pine plantations. I. The outbreaks of disease and ecological status of the fungus.** *Ann. Bot.* 14 (55), 1950 (365–83 + 2 plates). 29 refs. [Botany School, University of Cambridge.] O.R.E.

A study of the root disease associated with the killing of *Pinus sylvestris* and *P. nigra* var. *calabrica* in East Anglia. The affected areas have low rainfall and sandy soils which show considerable chemical variation. On former woodland sites trees are often killed soon after replanting. In plantations established on former arable or heath sites the disease appears chiefly after thinning. *Fomes annosus* is regularly found in some part of the root system. The infection always originates in stump roots and spreads to living trees by contact with the healthy roots. Affected trees may also transmit the disease to adjacent ones. Field observations suggest that *F. annosus* does not grow freely in the soil, but is confined to woody tissues. Its growth on samples of unsterilized litter or humus was either very restricted or nil; limited growth was obtained on soil samples from depths of 8 and 15–30 cm. The fungus grew well on the surface of

unsterilized Pine roots taken from a plantation on former chalk grassland but poorly on roots taken from a plantation on former *Calluna* heath. This difference was probably due to the abundance of competing fungi, such as *Trichoderma viride* in the latter site. An account is given of the interaction in culture of *F. annosus* with strains of *T. viride*, and a technique is described by which the interaction of fungi in roots was studied. Although *F. annosus* can invade roots already occupied by certain fungi, notably some causing blue stain, it is itself rapidly replaced in roots and stumps by *T. viride* and *Peniophora gigantea*. [Cf. *For. Abstr.* 12 (No. 1572).] *From author's summary.*

2344. Ito, K. **Studies on 'Murasaki-mompa' disease caused by *Helicobasidium mompa* Tanaka.** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 43, 1949. pp. 126 + 16 photos. 136 refs. [E.e.jap.]

Comprises: (1) etiological studies, (2) pigment production of *H. mompa*, (3) pathological anatomy of affected plants, (4) toxic effect of the culture medium of *H. mompa* on higher plants, and (5) cytological observations on *H. mompa*. The author was the first to succeed in effecting the artificial culture of this species. The host plants, which include many woody species, both gymnosperm and angiosperm, as well as agricultural crops, are very numerous; the author lists 104 species in 76 different genera belonging to 45 families. *H. mompa* is distributed throughout Japan and occurs also in Formosa, Korea and China. The symptoms of the disease (known as 'purple root rot') on several woody species (*Robinia pseudoacacia, Platycarya strobilacea, Acer campestre, Juglans sieboldiana, Paulownia tomentosa* and *Liriodendron tulipifera*) are described in detail. Sporophores are produced not only on host plants, but also on rocks, dead branches, heaps of earth, concrete foundations etc.

2345. Crandall, B. S. **The distribution and significance of the Chestnut root rot *Phytophthoras, P. cinnamomi* and *P. cambivora*.** *Plant Dis. Reptr.* 34 (6), 1950 (194–6). 16 refs. A.P.B.

A review of literature, with special reference to some recent publications in Spain and Portugal [cf. *For. Abstr.* 11 (Nos. 1466, 2268)]. The author concludes that *Phytophthora cinnamomi* plays a great part in disease of Chestnut in Spain, Portugal, France and Italy, and elsewhere in southern Europe, and is probably the major cause of death in the more southerly regions. *P. cinnamomi* has a considerable range of hosts. It has been found to attack *Castanea sativa, Juglans regia, Pseudotsuga taxifolia, Quercus robur, Q. suber, Betula alba, Cedrus atlantica, Abies nordmanniana, A. alba, A. sibirica* and *Castanea crenata* var. *tamba*. A close watch on Douglas Fir in the U.S.A. seems advisable in case a strain of the fungus should encounter and attack it. In contrast *P. cambivora* has only been found on *Castanea sativa* and *C. crenata* var. *tamba*.

2346. **Cypress canker.** *Rep. Dep. sci. industr. Res. N.Z.* 1950 (66).

Both wound and surface inoculation of young Lawson's Cypress trees with *Coryneum cardinale* isolated from infected nursery stock caused severe gummosis. Nine months after inoculation, cankers encircled the trunk and caused death of branches above the points of inoculation.

2347. Rudd Jones, D. **Canker disease of Cypresses caused by *Monochaetia unicornis*.** *Rep. E. Afr. Agric. For. Res. Organ. 1949*, 1950 (20–1).

A survey of the disease in Kenya shows that it has proved serious to *C. macrocarpa* over a wide range of sites, but to *C. lusitanica* only in high-rainfall areas, especially where ground mists persist at certain times of year. Infection mostly occurs at branch crotches where there is an accumulation of bark tissue in the form of a 'ruffle'. Water running down the stem lodges at these points and provides ideal conditions for spore infection. Wounding is not necessary for infection. The disease has been identified in *C. macrocarpa, C. lusitanica, C. benthami, C. arizonica* and *C. sempervirens*. [Cf. *For. Abstr.* 9 (No. 2541).]

2348. Thomas, G. P. **Two new outbreaks of *Phomopsis lokoyae* in British Columbia.** *Canad. J. Res.* 28*C* (5), 1950 (477–81). 4 refs. P.R.

Young Douglas Fir in British Columbia suffered from *P. lokoyae* during the winter of 1948–49. Damage in the form of stem and branch cankers, leader die-back, and stem girdling, was confined to trees, or parts of trees, of 4 in. diam. or less. Fungus activity was confined to Douglas Fir bark and cambium

tissues for the single dormant season. Outbreaks of the fungus are recurrent in British Columbia, reaching epidemic proportions only at irregular intervals. [Cf. *For. Abstr.* 4 (246–7).] *From author's abstract.*

2349. DAVIDSON, R. W. **The development of *Urnula craterium* on old *Strumella*-infected hardwood stems.** *Abstr.* in *Phytopathology* 40 (9), 1950 (870).

The possibility that *U. craterium* is the perfect stage of *S. coryneoidea* suggests that infected trees should not be left in the stand after felling.

2350. BIRAGHI, A., and PAVARI, A. I problemi posti della *Endothia parasitica* nel bacino del Mediterraneo. [**The problems presented by *Endothia parasitica* in the Mediterranean basin.**] *Monti e Boschi* No. 7, 1950 (291–300). [It.f.e.]

Includes statistical data on the distribution of *Castanea sativa* in Europe, with particular reference to the Mediterranean region. The area under Chestnut in Italy exceeds that in all the other countries together. Measures already taken for the control of *Endothia parasitica* in Italy are reviewed. The disease has already been reported from Switzerland, Spain and Jugoslavia.

2351. MOREAU, M. Note préliminaire sur une maladie chancreuse du chêne rouge dans le sud-ouest de la France. [**Preliminary note on a canker of *Quercus rubra* [*Q. borealis?*] in the south-west of France.**] *C.R. Acad. Agric. France* 36 (7), 1950 (255–6). 1 ref. [F.] A.P.B.

Isolations from the canker, which was found in the Basses Pyrénées, gave a species of *Phoma* and also a species of *Cylindrocarpon.* It is not yet clear which causes the canker, but it is evident that precautions against the spread of the pathogen in this region are necessary.

2352. PESANTE, A. Su una malattia della quercia rossa (*Quercus rubra* L.). [**A disease of *Q. rubra.***] *Ann. Sper. agr.* (*n.s.*) 4 (3), 1950 (439–51). 8 refs. [It.it.e.] C.G.B.

An infectious disease of *Q. rubra* [*Q. borealis?*] is described. Its main symptom is the presence on the trunk of a vertical depressed band of dead bark on which appear fructifications of a *Botryodiplodia.* Artificial inoculations have proved that this fungus behaves as a parasite.

2353. LUTTRELL, E. S. ***Botryosphaeria* stem canker of Elm.** *Plant Dis. Reptr.* 34 (5), 1950 (138–9). [Georgia Experiment Station.] A.P.B.

Describes a canker appearing at the base of the stem of a 3-year-old potted plant of *Ulmus americana*, and the fungus *Botryosphaeria ribis*, which caused it. Inoculation experiments on 3-month-old American Elm seedlings resulted in infection of all the plants, even of those in which no wounds were made.

2354. WESTBERG, D. L. **Cultivating boosts fusiform rust infection.** *Sth. For. Note Sth. For. Exp. Sta.* No. 69, 1950 (2).

Studies on plots of Slash and Loblolly Pine seedlings cultivated and fertilized and on untreated controls showed that the increase in growth was offset among the Slash Pines by increase in rust canker. [Cf. *For. Abstr.* 11 (No. 3285).]

2355. WAGENER, W. W. **Severe cold reduces rust in Pine plantations.** *Plant Dis. Reptr.* 34 (6), 1950 (193). A.P.B.

After the extremely cold winter of 1948–49 an examination was made of *Pinus ponderosa* var. *scopulorum* plantations in the Caribou National Forest, Idaho, where infection by a rust, *Cronartium comandrae*, had previously been apparent. In July 1949 much dead foliage was found, but nearly all of it was on branches or stems bearing rust cankers, or girdled by porcupine. Living cankers were found only in a part of the plantation occupying a gentle easterly slope, where the temperatures had probably been higher. Nearly all the trees will survive the killing of the cankered branches.

2356. SNELL, W. H. **Garden red currants and White Pine blister rust.** *J. N.Y. bot. Gdn.* 51 (608), 1950 (187–90).

Field observations by the author and a study of the number of sporidia produced on 3 groups of *Ribes* (black currant, wild gooseberry and cultivated currant) by *Cronartium ribicola*, led him to conclude that red currants are sufficiently resistant to the disease to be discounted as a source of infection. [Cf. *For. Abstr.* 4 (248).]

2357. RAMAKRISHNAN, T. S., and RAMAKRISHNAN, K. ***Chaconia tectonae* Ramakrishnan T. S. and K. sp. nov. on**

Teak. *Indian Phytopathology, New Delhi* 2 (1), 1949 (17–9). 4 refs. O.B.D.

Describes a new rust commonly found on *Tectona grandis* in the forests of Malabar and Coimbatore during October–February.

2358. TOOLE, E. R. **Soil treatments against the Mimosa wilt *Fusarium*.** *Abstr.* in *Phytopathology* 40 (8), 1950 (791).

Describes greenhouse and laboratory experiments with susceptible individuals of *Albizzia julibrissin* growing in soil infected with *Fusarium oxysporum* f. *perniciosum* and treated with various chemicals. Forty-four days after treatment, reduction of *F. oxysporum* f. *perniciosum* was 100% for Ferbam (ferric dimethyl dithiocarbamate), 85% for Phygon (2,3-dichloro-1,4 naphthaquinone), 55% for Puratized (para amino phenyl cadmium dilactate) and 25% for oxyquinoline benzoate. Number of trees wilted after each treatment was: none for Ferbam, 33% for Phygon, 25% for Puratized, 33% for oxyquinoline benzoate and 67% for controls.

2359. WENT, J. C. Verslag van de onderzoekingen over de iepenziekte en andere boomziekten, uitgevoerd op het phytopathologisch laboratorium 'Willie Commelin Scholten' te Baarn. **[Report on investigations of Elm disease and other tree diseases, carried out at the 'Willie Commelin Scholten' Phytopathological Laboratory, Baarn [in 1948 and 1949].]** *Meded. Com. Ziekt. Boomsoorten* Nos. 44, 1949. pp. 15. 6 tbls.; 45, 1950. pp. 12. [Du.e.] (*Versl. Inst. toegep. biol. Onderz. Nat. 1948* and *1949*.)

[Cf. *For. Abstr.* 11 (No. 683).] (1) *Ulmus*: Work on breeding and testing for resistance to *Ceratostomella ulmi* continues on the same lines as before. Some grafts of No. 139 (*U. hollandica vegeta* × *U. carpinifolia* [*U. foliacea*] No. 1) became severely diseased in 1949 and the supplying of this Elm to growers has been stopped. Among the more resistant Elms still under test are *U. carpinifolia* No. 62 ('Bea Schwarz') and No. 148 (*U. hollandica vegeta* × *U. carpinifolia* No. 28). The 1949 test included inoculations of *U. coritana* and *U. diversifolia* (species recently described from England), and *U. coritana* × *U. carpinifolia*. All of these developed serious disease after inoculation. Experiments in which solutions of ortho-oxyquinoline sulphate and benzoate were injected (as possible therapeutic agents) into trees of *U. hollandica*, gave no clear results. Reports are also included on inoculations with *Nectria cinnabarina*. (2) *Picea abies*: The disease previously reported increased in 1948 and 1949 in both extent and severity. The fungus provisionally identified as *Phoma* sp. now proves to be a species of *Leptothyrium*. Inoculations with this and other fungi isolated from the diseased trees gave no results, and the agent of disease remains unknown. (3) *Quercus borealis*: A slow die-back disease of this species at Deurne is being studied; attempts are being made to isolate a fungus from diseased branches.

2360. PLUMB, G. **Control of *Scolytus* and DED [Dutch Elm Disease] with concentrated sprays.** *Trees, Cleveland, Ohio* 10 (5), 1950 (8). 3 refs.

[For earlier reports on this project, see *For. Abstr.* 11 (No. 3300).] In the present experiment, trees were sprayed with a DDT emulsion by means of a mist-sprayer (a converted Bean Vapo-Duster No. 12). It was found that dosage can be correlated with trunk diameter but not with tree height. Dosage for a 10-in. tree is 1 gal. and this is increased by 1 gal. for every additional 5 in. in diameter. One spraying while the trees were dormant appeared to be as effective as two when they were in leaf. Spraying just before flowering gives optimum twig coverage. [Cf. *For. Abstr.* 12 (Nos. 2397, 2424).]

2361. MAHMUD, K. A. ***Cercospora* leaf-spot on *Schrebera swietenioides* Roxb.** *Curr. Sci.* 19 (9), 1950 (292–3). [Agricultural Research Institute, Nagpur.] A.P.B.

The fungus, first observed at Nagpur, is a new species, named by the author *Cercospora schreberae*.

2362. LOOS, C. A. ***Amphichaeta grevilleae* n.sp., on *Grevillea robusta* seedlings.** *Trans. Brit. mycol. Soc.* 33 (1/2), 1950 (40–2). [Tea Research Institute of Ceylon.] O.B.D.

Describes a fungus causing leaf-spot and defoliation of young *G. robusta* seedlings in a nursery in the Kandapolla ditrict.

2363. MEZZETTI, A. Osservazioni sulla morfologia e sulla tassonomia del *Gyroceras celtidis* (Biv.) Mont. et Ces. **[The morphology and taxonomy of *G. celtidis*.]** *Ann. Sper. agr.* 4 (5), 1950 (857–67). 7 refs. [It.it.e.] C.G.B.

This fungus causes a leaf-spot of *Celtis australis*.

44.4. *Virus Diseases*

See also *For. Abstr.* 12 (No. 2431).

2364. POSNETTE, A. F., ROBERTSON, N. F., and TODD, J. McA. **Virus diseases of Cacao in West Africa. V. Alternative host plants.** *Ann. appl. Biol.* 37 (2), 1950 (229–40 + 2 plates). 7 refs. [West African Cacao Research Institute, Tafo, Gold Coast.] O.R.E.

Describes both field and laboratory experiments to find alternative hosts for 4 viruses from Cacao, 3 occurring in the Gold Coast and one in Nigeria. The hosts of these viruses seem to be restricted to the Sterculiaceae and Bombacaceae. Symptoms in these indigenous host plants tend to show only when they are newly infected. Transmission by vectors is difficult and often impossible in the chronic (symptomless) phase. This suggests a virus concentration much lower than in Cacao, and accounts for difficulties experienced in obtaining transmission in the field from trees that have been infected for long periods. *Bombax buonopozense*, known to be susceptible to virus A1, is unimportant as a field host, because it is rarely a host of known vectors. *Ceiba pentandra* and *Cola cordifolia* are favoured host species of the vectors and are commonly found on Cacao farms. The development of spines on the stems of *Ceiba pentandra* is suppressed by infection with the virus A1. *Cola chlamydantha* is an important indigenous host, and is an exception to the rule that transmission becomes more difficult in the chronic stage. Poisoning of alternative host trees seems the only adequate method of controlling infection, and experiments to discover suitable poisons are in progress.

2365. SWINGLE, R. U., and BRETZ, T. W. **Zonate canker, a virus disease of American Elm.** *Phytopathology* 40 (11), 1950 (1018–22). 3 refs.

Ulmus americana trees grafted with bark patches from Elms suffering from Elm mosaic developed, in addition to mottle symptoms, zonate cankers in the bark of the upper stem and branches. These appeared to be of a virus nature, and could be transmitted by grafting and other methods, though not by leaf inoculations. The zonate canker has so far been found in New Jersey, Ohio and Missouri, both alone and in combination with the Elm mosaic virus.

45. DAMAGE BY ANIMALS

45.1. *Mammals*

See also *For. Abstr.* 12 (Nos. 1869–71, 1912, 1984, 2298).

2366. BUGBEE, R. E., and RIEGEL, A. **Seasonal food choices of the fox squirrel in Western Kansas.** *Transactions of the Kansas Academy of Science, Lawrence* 48 (2), 1945 (199–203). 3 refs. (*Contribution, Department of Zoology, Fort Hays Kansas State College* No. 52.) B.A.P.

The following choice of food by *Sciurus niger rufiventer* was noted at Hays, Ellis County, Kansas:—Late summer and autumn; nipple galls on *Celtis occidentalis*, *Juniperus virginiana* berries, pods of *Gleditsia triacanthos*, walnuts, bark of *Elaeagnus angustifolia*, and seeds of *Cucurbita foetidissima*. Summer: petiole galls on *Populus deltoides* or *P. sargentii*, seeds of *Celtis occidentalis*. Winter and spring: seeds and buds of *Ulmus americana*, exudations on the branches of Walnut, and fruit of *E. angustifolia*. The only serious damage was to *E. angustifolia*. The branches stripped of bark died, though the trees as a whole recovered.

2367. WAGGONER, D. W. **The gray squirrel in Western Vilas County.** *Wisconsin Conservation Bulletin, Madison* 11 (6), 1946 (3–5). B.A.P.

During Jan.-March, 1946, extensive damage was done to Maple [*Acer* spp.] by grey squirrel in this area. Smaller trees were stripped from base to top, while in larger trees the bark was peeled from the upper branches, the cambium layer being the part of the tree sought after. The cause of this change in feeding habits is unknown.

2368. BAILEY, R. A. **Squirrel damage.** *Wisconsin Conservation Bulletin, Madison* 11 (8/9), 1946 (5). B.A.P.

Damage to Maple by grey squirrel has been observed by the author in Washburn County for 20 years. Damage appeared in years when Hard Maple [*Acer saccharum*?] seed was not available, because of a poor seed crop, or ice-covered ground. No damage to Soft Maple [*A. saccharinum*?] was noted.

2369. Gunderson, H., and Decker, G. C. **Rodent pests of Iowa and their control.** *Bull. Ia. agric. Exp. Sta.* (*n.s.*) No. P43, 1942 (423–36). B.A.P.

Brief descriptions with an account of feeding habits. Tree pests include the pocket gopher, which cuts and stores roots, and mice and rabbits, both of which bark and girdle trees. Methods of control are briefly recommended.

2370. Cardinell, H. A., and Hayne, D. W. **Pen tests of rabbit repellents.** *Repr.* from *Quart. Bull. Mich. agric. Exp. Sta.* 29 (4), 1947 (303–15). 12 refs. B.A.P.

A report on experiments in the control of the cottontail rabbit (*Sylvilagus floridanus mearusii*) begun in 1937 at the Graham Horticultural Experiment Station, Grand Rapids, Mich., and continued until 1943. From a large number of repellent mixtures tested, a classification into 3 groups according to effectiveness is presented. It is suggested that disagreement in field reports may be due partly to local differences in rabbits' food preferences, and to differences in the severity of test conditions.

2371. Orr-Ewing, A. L. **Rodent control in direct seeding through use of poisons.** *Res. Note B.C. For. Serv.* No. 17, 1950. pp. 7 + 3 photos. 2 refs.

Detailed report on an experiment in treating a cut-over area with poisoned bait in order to control *Peromyscus* (deer mouse) before direct sowing. Bait was poisoned with Na fluoracetate (commonly known as '1080') an extremely toxic poison affecting all forms of animal life, with no known antidote, so that particular care is necessary in preparing and handling the bait. Poison baiting was done on 28 March immediately after snow-melt, and the spot sowing of Douglas Fir on 5 April. Comparison of germination on the poisoned plot (surrounded by a poisoned area ¼ mile wide) and the control plot showed a significant difference, mean germination per quadrat on the poisoned area being 3·87 compared with 0·47 on the other. No injury to other forms of animal life was observed, and since some mice survived, the area should be repopulated by the autumn, a desirable result since mice may have a beneficial as well as a harmful role.

2372. Cosens, R. D. and Tackle, D. **Costs of rodent control in Pine regeneration in California.** *For. Res. Notes Calif. For. Range Exp. Sta.* No. 73, 1950. pp. 5.

In two areas treated with lethal bait before seedfall, costs varied from 26 to 46 cents/acre.

2373. Juhren, G. **Protecting direct seedings in rodent-infested areas.** *J. For.* 48 (9), 1950 (443–4).

Pinus coulteri was sown along road embankments and cuttings in the Angeles National Forest and the following protective measures were tested:—(1) Pine-needle mulches 1 in. in depth, (2) straw mulches, (3) fibre screens, (4) beer cans (3 seeds per can), together with (5) unprotected controls. After 5 months the % survival, average height and condition under the different treatments were as follows:—(1) 8–20%, 2–4 in.; (2) 20%, 3 in. weak and chlorotic; (3) 38%, 4½ in., green and vigorous; (4) 55–61%, 5½ in., healthy and vigorous; (5) no survival. The cans were prepared by removing the bottoms and slicing the tops into prongs that let in the air but kept out the rodents. Since a greater survival was obtained with these than with fibre screens, which provide equally good protection against rodents, it would seem that the cans are in some way conducive to good growth. There was a difference of 6–8° F. between the soil temperatures 1 in. below the surface inside and outside the cans on a moderately warm day, and about 15° difference in the air temperatures. 'The cost of beer cans is negligible, since the road slopes of almost any highway will furnish an almost unlimited supply.'

2374. DeBoer, S. G. **The deer damage to forest reproduction survey.** *Wisconsin Conservation Bullletin, Madison* 12 (10), 1947 (3–23). B.A.P.

Describes the methods used by the Wisconsin Conservation Department in their survey begun in 1947, and presents and discusses some results.

2375. Swift, E. F. **Wisconsin's deer damage to forest reproduction survey.** *Repr.* from *Proceedings of 38th Convention of the International Association of Game, Fish and Conservation Commissioners* 1948 (181–203). B.A.P.

Presents in the form of annotated charts the results of 2 years' sample plot investigations into damage to forest regeneration by deer and rabbit. Statistics are given for 14 important forest species. It was estimated that deer cripple regeneration on about 1 in every 5

acres of forest land each year, and that annual destruction of seedlings in the state amounts to over 660 million.

2376. HARVEY-BATHURST, B. A. F. **A mechanized hole digger.** *Quart. J. For.* 44 (4), 1950 (220–1 + 2 photos).

An extensive trial was made on the Eastnor Castle Estate, Herefordshire, with an auger for digging post-holes, made by Harry Ferguson Ltd., Coventry. The auger is worked from the power take-off, and is attached to the hydraulic linkage of the tractor. Two augers were under trial, with diameters of 12 in. and 9 in. respectively. Both sizes dig a hole up to 2·5–3 ft. deep. For straightforward jobs, the auger can be worked by the tractor driver alone, but it will usually be advisable to have a second man to help clear obstructions, direct the point of the auger, and occasionally dig round it when it gets under a large root. The auger can be reversed by rotating the power take-off, using the Ferguson spanner. This usually suffices to free the auger from obstructions. On average soils and on sites where some obstruction may be expected from stones or roots in about one hole in seven, an average of about 25 holes 2·5 ft. deep can be maintained per hour for a working day compared with 5 holes/hour by manual labour with the same number of men. Allowing for depreciation of the tractor and auger at 3*s.*/hour, the cost per hole is *ca.* 4*d.*, compared with *ca.* 10*d.* by manual labour. The 12-in. auger is the more useful general-purpose size. For planting, its use is limited by slope and it would not be economical to use it on steep hillsides. On easier sites it would be useful for preparing holes for large transplants or where there is loose rock or where a pan has to be broken through. The auger is easily attached and detached, and if it is produced at a reasonable price, it should be of very great use on most agricultural and woodland estates, particularly where the soil is heavy and where fences have to be erected against stock.

2377. **Hole digger converts to saw.** *J. For.* 48 (9), 1950 (463).

The 'Earth Drill' just announced by McCulloch Motors Corporation of Los Angeles, is a new 5-h.p., petrol-driven, post-hole digger reported to be capable of drilling at a high speed in any type of earth or clay. It is portable, requires no tractor or vehicle for its operation, and can be converted into a standard McCulloch chain saw in less than a minute, since the engine is the same unit as that used on the saw. Weight of the 2-man Earth Drill complete with 6-in. auger is only 79 lb. A full-swivel coupling at the engine permits the auger to drill at any desired angle and to be reversed. Augers of 6, 9, and 12 in. diameter are available.

45.2. *Birds*

See *For. Abstr.* 12 (Nos. 1934–5).

45.3. *Insects*

See also *For. Abstr.* 12 (Nos. 1770, 1850–68, 1874–5, 1880, 1885, 1983, 2058, 2063, 2238–40, 2321–2, 2360, 2458, 2463).

2378. VITÉ, J. P. Eine neuartige Forstschutzkartei. [**A new card index for forest pest control.**] *Anz. Schädlingsk.* 23 (8), 1950 (120–1). 2 refs. [G.] [Forstzoologisches Institut der Universität Göttingen, Hann-Münden.]

Describes briefly the punched-card index being built up at the Forest Zoology Institute, Göttingen, for the purpose of identifying forest pests and giving information about control measures.

2379. BODENHEIMER, S. [**On the problem of forest insect control in the Middle East.**] *Forest, Palestine* No. 2, 1950 (32–5, Suppl. 7). [Heb.e.]

(1) *Salix babylonica* and *Populus euphratica* forests of the lower reaches of the major Middle East rivers are attacked in autumn by millions of *Monsteira lobulifera*, which cause premature leaf-fall. No control can be exercised. (2) *Thaumatopoea wilkinsoni*, widespread in Cyprus, Lebanon, and Mediterranean regions of Turkey, was introduced into Palestine 11 years ago, first near Ramallah, and 5 years ago at Sha'ar ha-Gai (Bab el-Wad), where it attacked the Canary Pine. The only known method of control is to collect winter nests in winter and burn them. (3) *Evetria buoliana thurificana* causes a temporary slowing of growth in pure stands of Pines. (4) A *Matsucoccus* sp. attacks only Aleppo Pine, and rarely does fatal damage to trees of 7–9 years and over. It causes, however, considerable interior damage to the tree in the course of time. It was first thought

to have been imported from outside, but is now believed to have existed in the country for a long time. It is being investigated at a field laboratory near Ein-Hashofet.

2380. SCHIMITSCHEK, E. Forstinsekten der Türkei und ihre Umwelt. **[Forest insects of Turkey and their environment.]** Volk und Reich Verlag, Prag-Amsterdam-Berlin-Wien. 1944. pp. 371. Numerous refs. [G.] [Buchreihe des Südostinstitutes für Wald- und Holzforschung der Südosteuropa-Gesellschaft und der Fachgliederung Forst- und Holzforschung im Reichsforschungsrat an der Hochschule für Bodenkultur in Wien.]

A comprehensive and well illustrated work consisting of descriptions of the forest insect pests to be found in Turkey and the type of damage they cause, following a short introductory account of the Turkish forests and their management.

2381. SCHWERDTFEGER, F. Über die Wirkung von Bekämpfungsmassnahmen im Forstschutz gegen Insekten. **[The effect of control measures against forest insects.]** *Zeitschrift für Pflanzenkrankheiten (Pflanzenpathologie) und Pflanzenschutz, Stuttgart* 55 (11/12), 1948 (341–6). 11 refs. [G.] I.I.E.

Discusses accuracy in forecasting the results of pest control measures with particular reference to the mathematical formula of Zwölfer, in which the control measures are reckoned only as an additional factor for mortality to those already existing in the insect population. The author maintains that the influence of natural enemies cannot be acccurately calculated, and that such a formula does not take into account the fact that control measures cause a disturbance in the biocoenosis which may finally prove not unfavourable to the pest. Some examples are cited.

2382. GARMAN, P. **Concentrated sprays for application by mist blowers for control of forest, shade and fruit tree pests.** *Circ. Conn. agric. Exp. Sta.* No. 177, 1950. pp. 19.

Includes formulas for concentrated spray mixtures of the following types: arsenicals, mineral oils, tartar emetic, nicotine, rotenone, pyrethrum, DDT, 666, Chlordane, Toxaphene, tetraethyl pyrophosphate, parathion, DN compounds, sulphur, Puratized, Ziram, Ferbam, Phygon, and Dithane; with some indication of the dosages and sprays suitable for use against particular pests.

2383. THALENHORST, W. Ein neues Verfahren zur Flugzeug-Schädlingsbekämpfung. **[A new method of aerial pest control.]** *Zeitschrift fur Pflanzenkrankheiten (Pflanzenpathologie) und Pflanzenschutz, Stuttgart* 55 (7/8), 1948 (233–6). 6 refs. [G.] I.I.E.

Describes experiments made in 1944 in spraying aerosol insecticides from aircraft. The apparatus is simple, consisting in principle of two containers with valves, feed pipes and nozzles. Good results were obtained in tests against *Bupalus piniarius* in the forest administration area of Selb. The insecticide penetrates easily into the stand, acts quickly (though too easily moved by air currents) and, whatever the poison, has no dangerous aftereffects on mammals and birds.

2384. DEONG, E. R., PEER, K. C., and FANCHER, L. W. **A new generator for producing dry aerosols with organic insecticides.** *J. econ. Ent.* 43 (4), 1950 (542–6).

The generator works by a process of thermal decomposition, a chemical reaction being set up by a starter strip of the friction match type.

2385. TURNER, N., and WOODRUFF, N. **Toxicity of DDT residues: effect of time of exposure of insects, coverage and tenacity.** *Bull. Conn. agric. Exp. Sta.* No. 524, 1948. pp. 35. 16 refs.

2386. PETTY, B. K. **Residual toxicity of chlorated hydrocarbon insecticides.** *Science Bulletin, Department of Agriculture, Union of S. Africa* No. 291, 1948. pp. 15. 3 refs. Price 3*d*.

Efficacy of (*a*) sprays, (*b*) smokes of DDT, Chlordan, 666 and pentachlorophenol on various painted and unpainted wood surfaces, glass, and an absorbent surface (filter paper) was tested against termites (adult workers of *Trinervitermes havilandi*). Results with sprays show that:—(1) 666 'knocked down' more quickly than DDT or Chlordan; (2) duration of residual toxicity of DDT was much greater than that of 666 or Chlordan, which were relatively ineffective on all surfaces 1–2 months after application, whereas DDT remained highly toxic on filter paper and caused appreciable mortality on distemper and glass, after 10 months; (3) a high proportion of insects

'knocked down' by 666 subsequently recovered on their removal from sprayed surfaces and final mortality was only 2%; (4) vertical surfaces did not retain the toxic deposit of smokes so well as horizontal surfaces; (5) 666 smoke deposits remained effective for slightly over 4 weeks whereas DDT and pentachlorophenol smokes retained their toxicity for at least 18 months on horizontal surfaces.

2387. GÄBLER, H. Gefährdet eine Forstbestäubung die Fische? **[Do insecticidal dusts endanger fish?]** *NachrBl. dtsch. PflSchDienst.* 27 (9), 1947 (143–4). [G.]

A brief review of the effects of dusts containing dinitro-*o*-cresol. In unfavourable circumstances damage to fish may occur, but is much less than with As-containing dusts.

2388. HENZE, O. Vogelschutz gegen Insektenschaden in der Forstwirtschaft. **[Bird protection for the control of insect damage in forestry.]** F. Bruckmann, München. 1943. pp. 292 + 16 coloured plates. [G.] Price [£2. 2*s*. 0*d*.]

The main chapters of this manual, which is commended in a preface by Dr. K. Escherich for its comprehensive treatment of the subject, including much original work and new information, are as follows:—Encouragement of colonization by birds as an important branch of protection against forest insect outbreaks (pp. 23–5). Evidence for the usefulness of birds, including summarized results of analyses of 5,000 pellets regurgitated by nestlings and recovered from nesting boxes in various parts of Germany in forests threatened by incipient insect outbreaks (pp. 25–30). The *Arbeitsvogel* or 'working bird', defined as a bird many breeding pairs of which can be induced to settle in a limited area of a forest for the control of a specified insect pest, with a table of important insects and the appropriate 'working bird' species (pp. 31–3). Natural and artificial nesting facilities in the modern production forest (pp. 33–8). Use of State-approved nesting boxes (pp. 39–44). Species inhabiting nesting boxes and their natural history, including birds (pp. 46–121), mammals (pp. 121–32), and insects (pp. 143–73). Hints on the hanging of nesting boxes: season, height, orientation, fixing, ladders, numbering and recording (pp. 173–7). Suitable and unsuitable sites for nesting boxes in various forest types (pp. 177–90). Assessing the number of boxes required—chiefly by the number of successful broods as recorded by annual inspection of the boxes (pp. 190–6). The execution of annual nesting-box inspections (pp. 196–207). Recording the inspection results (pp. 207–21). The settling of 'working birds' and their value in different types of forest against the major insect pests (pp. 222–46), against bark-beetles (pp. 246–7) and pests of minor importance (pp. 247–8). The introduction and value of wood ants for insect control (pp. 248–52). Bird protection in forest nurseries (pp. 252–8). Enemies of birds inhabiting nesting boxes (pp. 258–75). Winter feeding of birds (pp. 276–86). Drinking places for birds (pp. 287–90). The Bird Protection Service in Germany (pp. 290–2).

The work is illustrated throughout with copious photographs and 16 coloured plates.

2389. TINBERGEN, L. Bosvogels en insecten. **[Forest birds and insects.]** *Ned. Boschb.-Tijdschr.* 21 (4), 1949 (91–505). 10 refs. [Du.]

Results of observations on the food collected by blue and great tits during the nesting season are shown in graphs and tables. The following conclusions are drawn: (1) The tits account for only a very small % of larvae or caterpillars during a major infestation and do not contribute materially to its control. (2) They account for a high % of some but not all the important species of larvae, when the insect population is at its normal level. (3) The introduction of nesting boxes into a Pine wood (not more than 6 boxes per ha.) may increase the consumption of insects by as much as 50%. [Cf. *For. Abstr.* 11 (No. 697).]

2390. TURČEK, F. O jednej užitočnej činnosti veverice. **[One useful activity of squirrels.]** *Pol'ana* 5 (9/10), 1949 (178–9). [Slovak.]

A note by the author, while studying the ecology of the squirrel at the Institute for Forest Protection, Banska Stiavnica, on its habit of eating galls produced by *Chermes* [*Adelges*] *viridis* on conifer branchlets. This habit has been observed throughout the country, mainly, but not entirely, during the summer and especially in poor seed years. As the galls are eaten before the aphis nymphs emerge, squirrels are likely to exert considerable control on the spread of Chermes.

2391. **Nyatoh borer.** *Rep. For. Adm. Malaya* 1950 (15).

A large cerambycid beetle, not yet identified, has attacked all experimental plantations of Sapotaceae at Kepong. It apparently lays its eggs in the bark of exposed roots or the lower stem up to *ca.* 10 ft. from the ground, and the larvae enter the wood directly, making large galleries. The developmental period appears to be at least one year, which is unusually long for Malaya. Saplings up to 9 in. girth are killed and the basal logs of larger trees are rendered useless as timber. In some plantations about 25% of the trees have been attacked. As the larvae keep their tunnels clean, pushing the frass out by a large ejection hole, it is possible to kill them by introducing insecticides into the galleries; 10 c.c. of (*a*) E605 at a concentration of 1 : 1,000 in water, and (*b*) a saturated solution of paradichlorbenzene in kerosene, were injected into the galleries by means of a hypodermic syringe, and each gave a complete kill.

2392. Brown, C. E. **Strawberry root weevil.** *Bi-m. Progr. Rep. For. Insect Invest. Dep. Agric. Can.* 6 (5), 1950 (3).

Reports damage to young Spruce by *Brachyrhinus ovatus.*

2393. Fransen, J. J. Voorlopige proeven omtrent de gevoeligheid van *Brachyderes incanus* voor verschillende stuifpoeders. [**Provisional tests on the susceptibility of *B. incanus* to different insecticide powders.**] *Ned. Boschb.-Tijdschr.* 22 (2), 1950 (44). [Du.]

Different commercial insecticides in powder form were tested in the laboratory. Derris containing 0·3% rotenone, pyrethrum containing 0·3% pyrethrin, Gesarol with 5% DDT, Hexyclan with 2% BHC, Toxaphene 10%, Lirothion with 0·05% parathion and a Novosil mixture with 1% dinitrocresol all gave complete kills. The two last and Hexyclan are the most promising economically.

2394. Duterme, J. Essai de lutte contre l'hylobe par l'hexachlorocyclohexane $C_6H_6Cl_6$. [**An experiment in the control of the Pine weevil [*Hylobius abietis*] with hexachlorocyclohexane.**] *Bull. Soc. for. Belg.* 57 (10), 1950 (382–6). [F.]

Two-year-old plantations of Norway Spruce and of Scots Pine established immediately after clear felling of Spruce, were dusted with 25% Gammexane powder at rates of 15·5 kg./ha. and 26 kg./ha. respectively. Mortality in the Spruce plantation was 5·4% and in Scots Pine 6·5%, compared with 26·5 and 53·4% respectively for controls. Dusting with a 5% powder was less effective. Costs are calculated at 610–690 fr. (Belgian)/ha., for material and labour.

2395. Crosby, D. **Concentrated lead arsenate spray for control of White Pine weevil.** *J. For.* 48 (8), 1950 (334–6).

Results are reported of a programme of spraying for the control of *Pissodes strobi* on young *Pinus strobus* in Connecticut, using concentrated lead arsenate applied with a knapsack sprayer in the spring before the weevils become active. In nearly all treated areas, 100% protection against the weevil was afforded in the first year and the heaviest infestation in the 4th season after treatment was *ca.* 9%, compared with 17–32% on controls. A time study showed that the number of trees sprayed per man-hour ranged from 233 to 456, average 351.

2396. Bosq, J. M. Nota sobre un insecto dañino a los pinos del Uruguay y Argentina. [**Note on an insect damaging Pine in Uruguay and Argentina.**] *Abstr.* in *Idia* 2 (24), 1949 (10–1). [Span.] C.G.B.

Presents information on *Pissodes notatus* imported from Europe, first noted in Uruguay in 1942, later in Argentina in 1947, and now causing serious damage to Pine [*Araucaria*] stands on both shores of the Rio de la Plata.

2397. Robert, Fr. A. **Elm bark weevils.** *Rep. Dep. Lds. For. Quebec 1947–8*, 1949 (133–5 + 1 gph.).

Describes the life cycle of the 3 species of *Magdalis* (*M. armicollis*, *M. barbita* and *M. inconspicua*) found on Elms in Quebec. Laboratory experiments indicate that in certain circumstances these weevils can convey the Dutch Elm disease.

2398. Rummukainen, U. Über das Auftreten des Laubholzbohrers, *Hylecoetus dermestoides* L. (Col., Lymexylonidae), an Birken. [**The occurrence of *H. dermestoides* on Birch.**] *Annales Entomologici Fennici, Helsinki* 13 (3), 1947 (144–8). 7 refs. [G.] I.I.E.

Observations made during an outbreak in 1946 and 1947 in the neighbourhood of Padasjoki, Finland. *H. dermestoides* usually attacks trees already affected by various species of fungus. Once boring has begun, however, it may spread to parts of the tree as yet unaffected by fungus and facilitate further decay.

2399. HORBER, E. Maikäferfang mit Quecksilberdampflampen? **[Trapping cockchafers with mercury vapour lamps?]** *Mitteilungen der Schweizerischen Entomologischen Gesellschaft, Bern* 22 (1), 1949 (116–24). 10 refs. [G.] [Eidg. landw. Versuchsanstalt Zürich-Oerlikon.] I.I.E.

The lamps proved to be valueless for trapping *Melolontha melolontha*, only a very small proportion of chafers in flight being attracted by the light.

2400. MÜLLER, F. Maikäferbekämpfung. **[Cockchafer control.]** *Anz. Schädlingsk.* 23 (9), 1950 (131–2). [G.]

Outstanding success was obtained with a spray mounted on a lorry, using an 0·2% solution of 'Perfektan' (a 666 preparation) at a rate of about 160 l. per 100 m. of forest margin. [Cf. *For. Abstr.* 12 (No. 756).]

2401. GROSCHKE, F. Zum gegenwärtigen Stand der Engerlingsbekämpfung mit Hexa-Präparaten und deren Anwendungsmöglichkeit in der forstlichen Praxis. **[The present position in the control of cockchafer larvae by means of 666 preparations, and their potential use in forestry practice.]** *Anz. Schädlingsk.* 23 (7), 1950 (98–100). 5 refs. [G.] [Institut für angewandte Zoologie, München.]

2402. GAMBRELL, F. L., and STRICKLAND, L. F. **Control of white grubs in nursery plantings.** *J. econ. Ent.* 43 (4), 1950 (550–2). 4 refs. (*J. Pap. N.Y. St. agric. Exp. Sta.* No. 821, 1950).

Greenhouse experiments in the control of such species as *Phyllophaga rugosa* and *Macrodactylus subspinosus* damaging young conifers, demonstrated the efficiency of 666, Chlordane and parathion when applied at a rate of 5 lb. (γ isomer), 20 lb. and 15 lb./acre respectively. No appreciable damage to young trees was observed. [Cf. *For. Abstr.* 4 (252).]

2403. SHENEFELT, R. D., and SIMKOVER, H. G. **White grubs in Wisconsin forest tree nurseries.** *J. For.* 48 (9), 1950 (429–34).

Studies were made to discover a means of controlling scarabaeid larvae in conifer nurseries. It is evident that timing of soil treatment is important. The insecticide should be in the ground by the time the eggs are laid, as the grubs are most sensitive to toxicants shortly after hatching. Mixing the insecticide in the soil is more effective than application from above in the form of emulsions, solutions, or sprays containing wettable powders. Fumigation and mechanical killing of grubs with a rototiller are of use primarily when the ground is being worked and a heavy grub population is present. They do not prevent egg deposition among established stands. The use of Chlordane in nurseries is more desirable than that of 666, which is injurious to certain legumes such as are often used as a cover crop, and also causes a percentage of seedlings to die through abnormal root development. Both Chlordane and 666 applied as dust worked into the soil remain effective for at least 3 seasons under Wisconsin conditions and prevent the establishment of grubs. At present, 10% Chlordane dust is being applied to areas in the Wisconsin state nurseries at the rate of 10 lb. Chlordane/acre as the ground becomes free of trees. The dust is applied with a power row-crop duster to the bare ground, and then worked thoroughly into the soil with a disk or rototiller to a depth of *ca.* 8 in. The cost for materials is about $15.0/acre.

2404. ŽIVOJINOVIĆ, S. Gradacija potkornjaka u četinarskim šumama Srbije 1945/47 godine. **[Mass outbreaks of bark-beetles in the coniferous forests of Serbia in 1945/47.]** *Godišnjak Poljoprivedno-Šumarskog Fakulteta, Beograd* 1, 1948 (65–73). 4 refs. [Serb.russ.] E.M.B.

Describes the outbreak, which began in 1945, and spread by 1947 to an area of *ca.* 28,000 ha., 8,000 ha. of which was heavily infested with bark-beetle. The poor increment of conifers, which contributed to the outbreak, was due to droughts and fires in 1945–46, storms, heavy snowfalls, and such pests as mistletoe and squirrels. Another important factor was the great quantity of slash left in the forests after war-time fallings. Fourteen species were identified, belonging to the genera, *Ips*, *Pityogenes*,

Pityophthorus, *Pityokteines*, *Cryphalus*, and *Xyloterus*. The outbreak was expected to reach its peak in 1948.

2405. ŠLANDER, J. Zatrimo lubadarja! **[Let us destroy the bark-beetle!]** *Gozd. Vestn.* 7 (1), 1948 (4–12). [Sloven.]

Specific instructions for control, and especially trap-trees, in 1948, following the author's experiments and observations in 1947. He stresses the importance of leaving the top and branches on trap-trees and completely barking converted material.

2406. DEMME. Die Forstwirtschaft der sowjetisch besetzten Zone im Abwehrkampf gegen forstliche Grossschädlinge, ein Rückblick und Ausblick. **[The forest administration of the Soviet zone [of Germany] in the defence of the forests against large-scale infestations—the past and the future.]** *NachrBl. dtsch. PflSchDienst.* 28 (10/11), 1948 (165–9). [G.]

Reviews operations against bark-beetles and *Dendrolimus pini*.

2407. SCHWERDTFEGER, F. Stand der Borkenkäferbekämpfung in Deutschland. **[State of bark-beetle control in Germany.]** *NachrBl. dtsch. PflSchDienst.* 28 (9–10/11), 1948 (152–5; 169–72). 50 refs. [G.]

A review of methods used in Germany with a comprehensive bibliography.

2408. KOPP, W. Kosten der Käferbekämpfung. (Erfahrungszahlen der Badischen Landesforstverwaltung.) **[Cost of bark-beetle control. (Figures resulting from the experiences of the Baden State Forest Administration).]** *Arch. wiss. Ges. Land- u. Forstwirt.* No. 1, 1949 (16–7). [G.] C.G.B.

Presents estimates in *DM*/ha. for various methods.

2409. THALENHORST, W. Versuche mit insektiziden Streichmitteln zur Borkenkäferbekämpfung. **[Tests with insecticidal paints in bark-beetle control.]** *Arch. wiss. Ges. Land- u. Forstwirt.* No. 1, 1949 (40–2). [G.] C.G.B.

Describes 'DK4-Streichmittel Sch 317', an insecticidal paint manufactured by the firm Dr. Kurt Herberts & Co., Wuppertal-Barmen. This has the consistency of a thin syrup, is soluble in acetone and other solvents, and contains 'Gammexane' or some other suitable insecticide. At appropriate concentrations only one coat is needed to obtain excellent results on trap trees. The paint, being insoluble in water, is rain-proof, and remains active for 6 weeks or longer. It is applied at a rate of 0·4–0·5 l./sq. m. of bark surface. Its chief drawback is the time spent in application, though the author believes that this is offset by its great efficacy when compared with the usual dusts.

2410. KRAEMER, G. D. Der grosse Tannenborkenkäfer, unter Berücksichtigung seiner beiden Verwandten und der Brutbaumdisposition; *Pityokteines curvidens* Germ., *vorontzowi* Jakobs. und *spinidens* Reitt. Untersuchungen zur Biologie und Bekämpfung der Gattung *Pityokteines* Fuchs. (Coleoptera Ipidae). **[The greater Fir bark-beetle with reference to its two related species and the predisposition of trees to attack; *P. curvidens* Germ., *P. vorontzowi* Jakobs. and *P. spinidens* Reitt. Investigations into the control of *Pityokteines* Fuchs. (Coleoptera Ipidae).]** *Z. angew. Ent.* 31 (3), 1950 (349–430). 45 refs. [G.g.] [Institut für angewandte Zoologie, München.]

A comprehensive study which covers the geographical distribution of the species, their taxonomy, ecology and phenology, with special reference to their distinguishing features, their associated species, including parasites, and the physiology of infested trees. *P. curvidens* has normally two generations per year, depending upon the weather. It has a number of conifer hosts and shows some variations in the form of its galleries and in its breeding habits. Temperatures during the flight season vary between 11° and 18° C., flight being very dependent on insolation. A study of the predisposition of trees to infestation showed that when osmotic pressure in the bark falls below 7–8 atm., the tree is susceptible to attack by *P. curvidens* [cf. *For. Abstr.* 11 (No. 2294)]. An outbreak of this species largely depends on the availability of food, this being in turn dependent on the weather and preliminary depredations by other species. Tests with different contact insecticides showed that spraying barked trees with crude carbolineum gave a 100% kill of *P. curvidens*.

2411. FEYTAUD, J. Les Coléoptères du pin maritime. **[The Coleoptera infesting *Pinus***

pinaster.] *Ann. Éc. Eaux For. Nancy* 12 (1), 1950 (1–96 + 1 tbl.). 38 refs. [F.]

A monograph on the bark-beetles infesting *P. pinaster*.

2412. PALM, T. Ett angrep av *Dendroctonus micans* Kugel på tall. [**An attack by *D. micans* on Pine.**] *Entomologisk Tidskrift, Stockholm.* 69 (4), 1948 (212–4). I.I.E.

Instances are given of the presence of *D. micans* in Jämtland on Pine as well as on its normal host plant, Spruce.

2413. BEDARD, W. D. **The Douglas-Fir beetle** [***Dendroctonus pseudotsugae***]. *Circ. U.S. Dep. Agric.* No. 817, 1950. pp. 10.

Life history, damage and control.

2414. DAĞCI, A. N. Türkiye Iâdin mıntakasında kabuk böceği ve tahribatı. [**Bark-beetles in Turkish Spruce areas and the damage done.**] *Orman ve Av* 21 (12), 1949 (281–2). [Turk.]

Some account of the rapid spread of *Ips sexdentatus*, from an outbreak first noticed near Artvin in 1942–43, but not actively combated until 1949. By this time the beetle had spread enormously. It is not yet under control. Some 60% of the trees attacked [*Picea orientalis*] were young.

2415. HASE, A. Neue Arbeiten und Nachrichten über Fichtenborkenkäfer. [**New studies and reports on Spruce bark-beetles.**] *NachrBl. dtsch. PflSchDienst.* 28 (7/8), 1948 (131–3). [G.]

A list of German works published in 1947 and 1948.

2416. MERKER, E. Zur Biologie der Massenvermehrung der Fichtenborkenkäfer. [**The biology of the *Ips typographus* outbreak [in Baden].**] *Arch. wiss. Ges. Land- u. Forstwirt.* No. 1, 1949 (1–12). [G.] C.G.B.

The following important points emerge from this study: (1) Mass migrations play a relatively small part in the spread of the pest. (2) Emergence and flight seasons depend on local temperatures. Ground temperatures at a depth of 5 cm. need to exceed 12° C. before emergence from hibernation begins, and air temperatures 2m. above ground must exceed 20° before flight takes place. (3) While the air temperature of the stand remains below 30°, the tree or part of tree selected for attack also depends on temperature, i.e. its exposure to the sun's heat. (4) A hot summer encourages the outbreak. In 1947 there were 3 generations and a doubling of the whole population. (5) Beetles which have reached a certain stage of maturity leave the brood tree and hibernate in the ground. This process of maturation and emergence again depends on local temperatures, and can continue into December when the weather is favourable. [Cf. *For. Abstr.* 12 (No. 761).]

2417. AICHELE, H. Beitrag zum Mikroklima eines Käferkahlschlages. [**The microclimate of a beetle-infested area.**] *Arch. wiss. Ges. Land- u. Forstwirt.* No. 1, 1949 (43–9). 15 refs. [G.] C.G.B.

Presents in detail the results of recordings taken by means of thermographs in a beetle-infested area at an altitude of about 1,100 m. with a northerly aspect. The temperatures taken were in the cambium at various points in the tree, in the air surrounding the trees and in the ground at depths of 3 and 10 cm.

2418. SCHINDLER, U. Eine Massenüberwinterung des grossen Fichtenborkenkäfers (*Ips typographus* L.) an Kiefern. [**Mass hibernation of *Ips typographus* on Pine**]. *Z. angew. Ent.* 31 (3), 1950 (503–4). [G.]

Hibernating bark-beetles were found on Pines left standing after clearance of infested Spruce from a mixed stand. The beetles were found only in the butt, up to a height of 1·5 m. above the ground, and in the roots to a depth of 20 cm.

2419. GÄBLER, H. Milbe als Eiparasit des Buchdruckers (*Ips typographus* L.). [**A mite as egg parasite of *I. typographus*.**] *NachrBl. dtsch. PflSchDienst.* 27 (7/8), 1947 (113–5). 4 refs. [G.]

Observations on the mite, its life-history and habits.

2420. MERKER, E. Bericht über die Besichtigung der Borkenkäfergebiete vom Hochschwarzwald im Anschluss an die Tagung in Freiburg i. Br. am 19 Oktober 1948. [**Report on the inspection of the bark-beetle-infested areas of the upper Black Forest in connexion with the conference [on biology and control of *Ips typographus*] in Freiburg i. Br. on 19th October 1948.**] *Arch. wiss. Ges. Land- u. Forstwirt.* No. 1, 1949 (54–5). [G.] C.G.B.

2421. HOHENLOHE-LANGENBURG, PRINZ K. Die Bekämpfungserfolge beim Fichtenborkenkäfer in Königseggwald. **[Results of control measures against *Ips typographus* in Königseggwald.]** *Arch. wiss. Ges. Land- u. Forstwirt.* No. 1, 1949 (13–5). [G.] C.G.B.

Cf. *For. Abstr.* 11 (No. 2296).

2422. SCHIMITSCHEK, E. Erfahrungen bei der Anwendung von Kalkarsenspritzbrühe zur Bekämpfung des achtzähnigen Fichtenborkenkäfers (*Ips typographus*). **[The use of calcium/arsenic sprays in the control of *Ips typographus*.]** *Pflanzenschutzberichte, Vienna* 2 (1/2), 1948 (16–27). [G.] I.I.E.

Presents some facts learnt from operations in Lower Austria in 1947, where about 10,000 cu.m. of Spruce attacked by *I. typographus* were treated with complete success. Sprays containing 5% As_2O_5 were used in 3 ways:—(1) against young emerging beetles; (2) on recently felled trap trees; and (3) against adult beetles during the flight season. An average of 1·8–1·9 kg. of chemical per cu.m. was found adequate. The results of investigations into the As content of the bark, bast and sapwood of treated trees, and of the beetles themselves after various lengths of time, are presented. These are very variable, the differences being due to a wide variety of factors. Arsenic content of the sapwood was very low, indicating that timber from treated trees may be used without danger. The As appears to penetrate easily into the bast fibres, independently of any bore-holes. The concentration in the bast increases with the lapse of time after treatment. The As content of the beetles themselves varied between 0·013 and 0·016% of the body weight. The trees first attacked must be felled without exception and treated immediately while the weather is dry and before the young beetles emerge. Rain after the spraying is advantageous, since it assists the penetration of the spray into the cambial zone. The great advantage of the As-spray method is the saving in time effected in comparison with mechanical control methods or with contact poisons used in dust form. No early bark stripping and burning is necessary as with the latter. The method is not recommended for winter operations. Its disadvantages are the high toxicity of the chemical and the need for transporting water. [Cf. *For. Abstr.* 11 (No. 2296).]

2423. MERKER, E. Der Wert der Bekämpfungsmassnahmen gegen den Fichtenborkenkäfer. **[The value of control measures against *Ips typographus*.]** *Arch. wiss. Ges. Land- u. Forstwirt.* No. 1, 1949 (21–39). [G.g.] C.G.B.

The results of work in Baden are presented. Spring and summer operations proved most successful, except where whole areas could be burned and hibernating beetles destroyed. Setting trap trees is a most important control measure; various procedures and results are described, and the efficacy of different insecticides, particularly Ca $(AsO_4)_2$ suspensions, are discussed. The examination of bark and bast of treated trees [cf. preceding abstract] showed that distribution of As beneath the bark was very patchy though it improved during rainy weather. Where the bark was sound, however, no As has penetrated as far as the cambium. The author concludes that the results were not good enough to warrant the use of Ca $(AsO_4)_2$ suspensions. Better results were obtained with 666, when the trap tree was dusted both before the attack and again after bark stripping. [Cf. *For. Abstr.* 11 (No. 2296).]

2424. BROMLEY, S. W. **Tests on Elm *Scolytus* 1949.** *J. econ. Ent.* 43 (3), 1950 (397–8). [Bartlett Tree Research Laboratories, Stamford, Conn.]

Young *Ulmus americana* trees were sprayed with Toxaphene wettable powder (5 lb./100 gal. water) and Methoxychlor (5 lb. 50% wettable powder/100 gal. water) and caged in celluloid. *Scolytus multistriatus* adults were introduced into the cages throughout the flight season of the first brood of beetles. The Toxaphene-sprayed tree showed 12 feeding punctures on the bark. A leaf-drop of about 40% resulted from spray injury and *Scolytus* feeding. The Methoxychlor-sprayed tree showed no feeding punctures and no spray injury. The results show that Methoxychlor has definite promise, whereas Toxaphene is decidedly inferior and does not compare with DDT. [Cf. *For. Abstr.* 11 (No. 1504); 12 (No. 2360).]

2425. DAVIES, F. H. **The leaf-nest aphis *Prociphilus nidificus* (Lw.) on Ash in North Wales.** *Quart. J. For.* 44 (4), 1950 (223–4).

2426. KNOWLTON, G. F., and HALL, L. L. **A new Oak aphid from Utah.** *Entomological News, Lancaster, Pa.* 60 (9), 1949(240–1).

[Utah State Agricultural College, Logan.] I.I.E.

2427. MILLIRON, H. E. **Description of a new Mymarid [*Ooctonus aphrophorae*] which parasitizes the eggs of the Saratoga spittlebug [*Aphrophora saratogensis*].** *Annals of the Entomological Society of America, Columbus, Ohio* 40 (2), 1948 (217–20). [U.S. Bur. Ent.] I.I.E.

2428. PRITCHARD, A. E., and BEER, R. E. **Biology and control of *Asterolecanium* scales on Oaks in California.** *J. econ. Ent.* 43 (4), 1950 (494–7). 8 refs. [University of California, Berkeley.]

Both *A. minus* and *A. quercicola* are commonly found on *Quercus lobata* and *Q. douglasii* in California, and occasionally on *Q. agrifolia* and *Q. kelloggii*. Excellent control of all stages of *A. minus* was obtained with a spring application of a 27% light-medium foliage oil together with 1·5 lb. Toxaphene (formulated as an emulsion).

2429. DELONG, D. M., and ROSS, H. H. **A new species of *Dikraneura* from Witch-Hazel (Homoptera-Cicadellidae).** *Ohio J. Sci.* 50 (2), 1950 (86–7). C.G.B.

D. hamar on *Hamamelis virginiana* in Tennessee.

2430. FLOCK, R. A. ***Empoasca bipunctata* introduced into California.** *J. econ. Ent.* 43 (4), 1950 (565). [University of California, Citrus Experiment Station, Riverside.]

Elm (particularly *Ulmus parvifolia*) seems to be the sole breeding host plant of *E. bipunctata* in California, though the insect disperses to many other plants also. Considerable defoliation is caused by feeding on the mesophyll tissue. DDT dusts give satisfactory control.

2431. BAKER, W. L. **Recent developments on transmission of Elm phloem necrosis disease.** *Abstr.* in *Proceedings of the Entomological Society of Washington, Washington, D.C.* 52 (1), 1950 (52). I.I.E.

[Cf. *For. Abstr.* 10 (No. 3066).] Promising results were obtained in control of *Scaphoideus luteolus*, which transmits the virus, when DDT was applied (*a*) to the bark of Elms before hatching in spring, and (*b*) to Elm foliage regularly during the growing season.

2432. OTAMENDI, J. C. **Las hormigas podadoras—formas de combatirlas. [Leaf-cutter ants—control methods.]** *Idia* 2 (22), 1949 (8–12). [Span.] C.G.B.

Discusses the distribution of *Atta* spp. and *Acromyrmex* spp. in Argentina, and describes 3 types of apparatus for injecting toxic gases into nests.

2433. HASE, A. **Über die Holzwespe *Xiphydria prolongata* (Fam. Siricidae) und ihre praktische Bedeutung. [Wood wasps (*X. prolongata*) and their practical significance [as a pest of trees].]** *NachrBl. dtsch. PflSchDienst.* 28 (5/6), 1948 (70–4). 10 refs. [G.]

Characteristics and life history.

2434. BENSON, R. B. **An outbreak of *Pristiphora subarctica* (Forsslund) Hym., Tenthredinidae) a new British sawfly on Spruce.** *Ent. mon. Mag.* 86 (1034), 1950 (223). [British Museum (Natural History), London.]

Larvae of *P. subarctica*, formerly only known in Swedish Lapland, where it causes serious damage to Spruce, were found near Lydney in Gloucestershire in 1949.

2435. **Pine sawfly.** *Rep. Sth. For. Exp. Sta. 1948* [?1949] (29).

A series of paired trees, defoliated and non-defoliated by the Pine sawfly (*Neodiprion banksianae*), were selected for study of current-growth loss resulting from defoliation. The trees included both *Pinus echinata* and *P. taeda*. Preliminary analysis shows that with forest-grown trees, 75% defoliation or more will reduce growth at least 50% during the year of defoliation, and will result in additional loss of growth during the following year.

2436. BIRD, F. T. **The dissemination and propagation of a virus disease affecting the European Pine sawfly, *Neodiprion sertifer* (Geoff.).** *Bi-m. Progr. Rep. For. Insect Invest. Dep. Agric. Can.* 6 (5), 1950 (2–3).

Infested trees were sprayed with various concentrations of virus suspension in water (the stock suspension from which the sprays were prepared consisted of 2,000 virus-killed larvae in 2,000 c.c. of water). It was found that 0·1 c.c. of the suspension in 3 gal. of water gave an infective spray and the rates of larval mortality increased with the concentration of

the virus up to 100 c.c./3 gal. which produced 100% mortality. All the foliage was drenched in spray, 3 gal. of virus suspension being used on 20 trees *ca.* 4 ft. high.

2437. KOZIKOWSKI, A. Znamionek jedlicowy (*Megastigmus spermotrophus* Wachtl.)—(*Hymenoptera, Chalcididea*) w Polsce. [***Megastigmus spermotrophus* in Poland.**] *Repr.* from *Roczn. Nauk roln.* 51, 1948 (281–6). 5 refs. [Pol.e.]

The existence of *M. spermotrophus* in Poland has been established in the seeds of Douglas Fir grown in an experimental forest. Search in two other sites proved negative. From the infested trees, only 1·6% of all seeds (4% of seeds with kernels) were sound.

2438. NUNBERG, M. Poproch cetyniak. [***Bupalus piniarius* L.**] *Ulotk. Wydaw. pop. (Ser. C.) Inst. Bad. Leśn.* No. 10, 1948. pp. 17. [Pol.]

Describes the external appearance, habits and life history, enemies and control of *Bupalus piniarius*.

2439. HEQUIST, K.-J. Om parasiter på tallmätaren (*Bupalus piniarius* L.). [**Parasites of the Pine looper moth (*B. piniarius*).**] *Annales Entomologici Fennici, Helsinki* 14 (Suppl.), 1949 (88–92). 6 refs. [Sw.e.fi.] I.I.E.

Most important of the parasites obtained in Sweden in 1943–45 were (*a*) egg: *Telenomus phalaenarum* and *Trichogramma evanescens*; (*b*) larval and pupal: *Lydella nigripes* and *Heteropelma calcator*.

2440. DAVIAULT, L. Les livrées. [**The [North American species of] tent caterpillars.**] *For. et Conserv.* 2 (5; 6), 1950 (677–81; 765–8). 6 refs. [F.]

Life history, damage, and control of *Malacosoma americana, M. disstria* and *M. pluvialis*.

2441. GÄBLER, H. Stilettfliegenlarven (Thereoidae) als Vernichter von Kiefernspinnerraupen. [**Thereoid larvae as destroyers of Pine moth caterpillars.**] *Anz. Schädlingsk.* 23 (8), 1950 (120–1). [G.]

Laboratory experiments proved that thereoid larvae prey upon the larvae of *Dendrolimus pini*. [Cf. *For. Abstr.* 7 (No. 2056).]

2442. SCHMIDT, M., and KIND, H. E. Mit Motorverstäuber und Gesarol gegen Goldafterraupen auf hohen Strassenbäumen. [**Motor-driven tree dusters and Gesarol in the control of *Euproctis chrysorrhoea* larvae on tall roadside trees.**] *NachrBl. dtsch. PflSchDienst.* 28 (7/8), 1948 (133–4). [G.] [Pflanzenschutzamt Potsdam.]

The generally accepted method of controlling *Euproctis chrysorrhoea*, i.e. the destruction of the nests of hibernating larvae, is not always possible when very tall trees are involved. In Eberswalde, dusting of Oaks with DDT in spring when the larvae were leaving the trees gave good results, and on days when wind was unfavourable, dusting of the trunks up to a height of 1 m. above the ground made a successful trap for descending larvae.

2443. BURGESS, E. D. **Development of gypsy moth sex-attractant traps.** *J. econ. Ent.* 43 (3), 1950 (325–8). 3 refs. [U.S. Bur. Ent.]

Reviews briefly past and present work in the development of such traps and describes some examples.

2444. ROEGNER-AUST, S. Der Infektionsweg bei der Polyederepidemie der Nonne. [**Transmission of the polyhedral disease of the nun moth.**] *Z. angew. Ent.* 31 (1), 1949 (3–37). 58 refs. [G.]

[Cf. *For. Abstr.* 12 (Nos. 1853–4).] A study of pupae, adults and eggs showed that infection is transmitted from one generation to another through the egg. Furthermore, latent infection can exist in a population from generation to generation. An outbreak of the moth is therefore accompanied by a corresponding multiplication of latent infections which, when climatic conditions are suitable, will give rise to an epidemic of the acute disease—known to be highly dependent upon climatic factors. Since the last cannot be controlled and all attempts to spread the disease by artificial dissemination of the virus in the forest have so far failed, the prospects for biological control by this means are poor, and unless an epidemic of the disease is in progress, outbreaks of the moth should be controlled by insecticides.

2445. ROEGNER-AUST, S. Populationsanalytische Untersuchungen über die Sterblichkeit von Nonnenraupen. [**Population analyses to investigate the mortality of**

***Lymantria monacha* larvae.]** *Z. angew. Ent.* 31 (2), 1949 (181–207). 18 refs. [G.g.]

Studies of larval mortality and its causes were carried out on insects from various parts of Germany and Sudetenland. There are marked variations in the state of health of larvae from different areas, even where these closely adjoin. The state of health of different generations of the same population also varies considerably. Tests for the forecasting of mass outbreaks are only reliable when made in the spring.

2446. SCHEDL, K. Erfahrungen und Beobachtungen anlässlich der Nonnengradation in der Steiermark in den Jahren 1946 bis 1948. **[Discoveries and observations resulting from the nun-moth outbreak in Styria during 1946–48.]** Verlag Ferd. Kleinmayr, Klagenfurt. 1949. pp. 129 + 14 photos. 34 refs. [G.]

A detailed report of observations on *Lymantria monacha* made during the outbreak. It includes studies of location, choice of species, effects of feeding, distribution of the eggs on the trunk, egg mortality, emergence of the larvae, various phases in the life history of the insect, its natural enemies, particularly the nun-moth tachinid, methods of forecasting outbreaks, control measures (including both laboratory and field experiments and their results), the estimation of damage, subsequent bark-beetle attacks, and the recovery of damaged timber. [Cf. *For. Abstr.* 11 (No. 2300).]

2447. GÄBLER, H. Vorteile der Frühbestäubung bei der Nonne unter besondere Berücksichtigung der Tachinenvermehrung. **[Advantages of early dusting in *Lymantria monacha* control with special reference to the reproduction of tachinids.]** *Z. angew. Ent.* 31 (3), 1950 (441–54). 16 refs. [G.]

Discusses suitable time of year for control by dusting, and reviews data on parasitism by tachinids.

2448. KALANDRA, A. Novodobé prostředky v boji proti mnišce. **[Modern methods in nun-moth control.]** *Vestn. čsl. Akad. zeměd.* 23 (8), 1949 (395–403). 29 refs. [Cz.russ.] C.G.B.

Reviews the problem of nun-moth control with particular reference to Czechoslovakia and to aerial dusting with Gesarol (DDT) and factors affecting its success. Includes brief notes on power dusting from the ground with a mobile 4- to 5-h.p. machine. Such machines have recently been mounted by the Forest Service on Gravely tractors. [Cf. *For. Abstr.* 12 (No. 1615).]

2449. STEUDEL, W. Die Wirkung einiger Kontaktgifte auf Nonnenraupen im klimatischen Optimum. **[The effect of some contact poisons on *Lymantria monacha* larvae in optimum climatic conditions.]** *Z. angew. Ent.* 32 (1), 1950 (49–85). 40 refs. [G.g.]

The effects of dinitro-*o*-cresol [DNOC], pyrethrum and derris, were studied on different stages of nun-moth larvae, raised in the laboratory under optimum conditions. DNOC was noticeably quicker in its effects than the other two poisons, the differences being more marked in the third instar than in the first. The survivors, however, recovered more quickly and showed fewer after-effects from DNOC. The greater the susceptibility of the instar, the quicker the recovery of the survivors. With the more slow-working poisons derris and pyrethrum, recovery was slower and effects more prolonged. With derris, after-effects were noticeable up to time of oviposition.

2450. GÄBLER, H. Erfolgreiche Gesarolbestäubung gegen den Schlehenspinner (*Orgyia antiqua* L.) im Erzgebirge. **[Successful dusting with Gesarol to control *O. antiqua* in the Erzgebirge.]** *NachrBl. dtsch. PflSch-Dienst.* 28 (3/4), 1948 (54–5). [G.]

An application of DDT dust at a rate of 100 kg./ha. gave good control of *O. antiqua* larvae in a forest nursery.

2451. GÄBLER, H. Verteilung der Parasitierung und Hyperparasitierung in dem Kieferneulen-Befallsgebiet der Laussnitzer Heide. **[Distribution of parasitism and hyperparasitism in the area of the Laussnitzer Heide infested by *Panolis flammea*.]** *NachrBl. dtsch. PflSchDienst.* 28 (10/11), 1948 (172–4). 5 refs. [G.]

Field investigations showed a very uneven distribution of parasites.

2452. JAHN, E. Beobachtungen über Parasitenauftreten im Zusammenhang mit dem Massenauftreten des grauen Lärchenwicklers, *Grapholitha* (*Semasia*) *diniana*, in Tirol im Jahre 1947. **[Parasites associated with the**

outbreak of *S. diniana* in the Tirol in 1947.] *Pflanzenschutzberichte, Vienna* 2 (11/12), 1948 (176–82). 2 refs. [G.g.e.] I.I.E.

A short report on the parasites which contributed to the control of the outbreak. [Cf. *For. Abstr.* 11 (No. 2298); 12 (No. 1854).]

2453. MEYER, A. Untersuchungen über die Bekämpfung des grauen Lärchenwicklers (*Semasia diniana* Gn.) in den Wäldern des Ober-Engadins. **[Experiments in the control of *S. diniana* in the forests of the Upper Engadine.]** *Mitteilungen der Schweizerischen Entomologischen Gesellschaft, Bern* 20 (5), 1947 (452–74). 9 refs. [G.] [J. R. Geigy A.G., Basel.] I.I.E.

A description of the Larch tortrix and its habits, a history of attacks in Switzerland from 1919 to 1946, and an account of an outbreak in the Upper Engadine in 1946. The tortrix seems to be endemic, outbreaks occurring when parasites are reduced below a certain level. In the first year lightly stocked pure Larch stands are attacked; in the 2nd year both mixed and pure stands; in the 3rd year the attack is less intense, but is particularly noticeable on *Pinus cembra*. In 1946 experiments were carried out on control with DDT dust. Two areas in the neighbourhood of Pontresina were chosen:—(1) a 150-year-old mixed stand of Larch, *P. cembra* and *P. sylvestris*, and (2) a 70-year-old pure Larch stand. In (2) 65 kg. of dust were used on 20 ares of forest. In (1) 435 kg. were used on 6 ha. i.e. 72·5 kg. per ha. The experiments were entirely successful. The fact that the effects of the dust were fully adequate in areas not directly treated proved that the amounts used were too high. This problem is being investigated. Complete treatment of the whole affected area in the Engadine will only be possible if aircraft are used. [Cf. *For. Abstr.* 11 (No. 2298); 12 (No. 1854).]

2454. REEKS, W. A., and FORBES, R. S. **Native parasites of the Spruce budworm in the Maritime Provinces.** *Bi-m. Progr. Rep. For. Insect Invest. Dep. Agric. Can.* 6 (5), 1950 (1).

A summary has been prepared of the Spruce-budworm parasites reared from the Maritime Provinces up to the end of 1949. Twenty-two identified species have been obtained, of which the most abundant in 1949 was *Apechthis ontario*. Two others, *Glypta fumiferanae* and *Apanteles fumiferanae*, are very scarce during the present period of rising population, though they were abundant and widely distributed during the severe outbreak that began in New Brunswick in 1913. It appears that the parasite complex may vary with the host population. Of the 22 parasites, 14 have been recovered from other hosts.

2455. TRIPP, H. A. **Injury to White Spruce cones by Spruce budworm.** *Bi-m. Progr. Rep. For. Insect Invest. Dep. Agric. Can.* 6 (5), 1950 (1–2).

Larvae of the Spruce budworm (*Choristoneura fumiferana*) and of the Spruce needleworm (*Dioryctria reniculella*) were found on various trees of *Picea glauca*, apparently feeding on the new cones. In further investigations, Spruce-budworm larvae were observed to feed in and on the cones, in most cases in preference to foliage. Some of the cones were completely destroyed while many more were gnarled and curled as a result of lighter feeding. Exuded gum, resulting from light feeding, would prevent the cones from opening properly to release the seed.

45.4. *Other Animals*

See also *For. Abstr.* 12 (No. 1770).

2456. SCHUDER, D. L. **A mite infestation of the Honey Locust.** *J. econ. Ent.* 43 (3), 1950 (397). [Purdue Univ. agric. Exp. Sta.]

Tetranychus ellipticus was found defoliating *Gleditsia triacanthos* at Lafayette, Indiana, in 1949. The trees came into leaf again in the latter part of August. A spray of parathion and 50% K-6451 (*p*-chlorophenyl *p*-chlorobenzenesulphonate, a new acaricide) was successful in controlling the mite. One lb. of the 25% wettable powder of parathion and 1 lb. of the acaricide were diluted with 100 gal. water.

2457. TARJAN, A. C. **A consideration of mineral nutrition of Boxwood in relation to infection by meadow nematodes, *Pratylenchus* spp.** *J. Wash. Acad. Sci.* 40 (5), 1950 (157–61). 17 refs. (*Paper, Division of Plant Pathology, University of Maryland* No. 95. *Contribution, Maryland Agricultural Experiment Station* No. 2203). A.P.B.

Six-month-old plants of *Buxus sempervirens* var. *suffruticosa* were exposed for 6 months to attack by *Pratylenchus* sp. and were afterwards examined for mineral content and compared

with controls. Amounts of Ca, Na and P in diseased stem, leaf and root samples were higher than in healthy samples; with K the reverse. Mg contents were higher in healthy stem and leaf samples and in diseased roots. It is suggested that the symptoms of disease are due not to a gradual rotting away of the root system, but to the plant's response to oesophageal secretions ejected by the nematodes. A normal balance of mineral nutrients might be restored by applying fertilizers containing relatively heavy concentrations of K and low concentrations of Na, N and P.

46. DAMAGE BY MAN

2458. WEATHERBY, H. **War, bud worms and bark beetles.** *B.C. Lumberm.* 34 (8), 1950 (39–40, 68).

An account of measures recommended at a meeting of the Western Forestry and Conservation Association Forest Protection Committee with the State Foresters of Washington, Oregon, Idaho, Montana and California, against sabotage, fire dangers from misuse of power saws, and Spruce budworm and Spruce bark-beetle. A chipper to chew up roadside debris and blow it back into the forest has been developed.

2459. DAY, W. R. **Cambial injuries in a pruned stand of Norway Spruce.** *For. Rec. For. Comm., Lond.* No. 4, 1950. pp. 11.

A severe case of bark necrosis has occurred in Drummond Hill Forest, Perthshire, on Norway Spruce treated experimentally by the removal at various times of the year of some of the lower live branches. The injuries are diagnosed as having arisen owing to frost damage which occurred usually after the pruning had taken place and either at the beginning or end of the growing season. Unpruned trees suffer from the same type of injury, but to a much less extent; though sometimes large areas of bark may die on such trees, especially at the base of the main stem. It is shown that the wood made by these Spruces is abnormal in that its cell walls are of a weak structure and tend to be insufficiently lignified. This applies especially to the latewood, which in some years appears almost completely absent. It is also typical of these trees that the annual ring ends abnormally, indicating that their growing season is unduly long considering the type of climate in which they grow. The same type of injury occurs on Sitka Spruce, and commonly the wood produced by this species is also of poor character. Japanese Larch is also affected and one instance is known where it has suffered severely. *Author's summary.*

2460. ARBOGAST, C. **How much does felling large cull trees damage the understory [in northern hardwoods].** *Tech. Notes Lake St. For. Exp. Sta.* No. 337, 1950. pp. 1.

Detailed records were made of the effect of felling 17 cull trees averaging 25 in. d.b.h., 67 ft. in height, 27 ft. in crown diameter, and 36 ft. in crown length. Felling was done with a power saw by a 2-man crew using all reasonable care. For each tree felled, 1½ trees were damaged beyond recovery and another 3½ severely damaged. Some damage was done to about half the trees in the impact zone of the crowns of falling trees. The use of girdling or poisoning rather than felling is recommended.

47. INJURIES OF ALL KINDS TO INDIVIDUAL TREE SPECIES

See also *For. Abstr.* 12 (No. 1686).

2461. HEPTING, G. H., and JEMISON, G. M. **A cure for littleleaf disease?** *Amer. Forests* 56 (11), 1950 (20–22, 30).

Suggests silvicultural methods of combating the disease.

2462. AGOSTINI, R. La pineta d'Ischia. **[The Pine wood of Ischia.]** *Monti e Boschi* No. 9, 1950 (398–403). [It.f.e.]

The famous Pine wood of Ischia composed of *Pinus pinea* sown 1850–54, shows signs of dying back, probably due to the shallowness of the soil, which hardly covers the trachitic lava.

2463. BARTON, A. J., BROWN, L. R., KIMBALL, M. H., MILLER, P. A., ROEWEKAMP, F. W., and WILCOMB, H. **What's wrong with So. Calif. Oaks?** *Trees, Cleveland, Ohio* 10 (5), 1950 (10–1, 22, 24).

The decline and death of native Oaks on unirrigated hills and in canyons in S. California is due to the low rainfall of the past 6 years. Trees in parks, gardens etc. suffer principally from over-irrigation and paving or other impervious coverings over the rooting area.

Fungus diseases are also favoured by heavy nitrogen applications, severe pruning, or defoliation by insects, all of which promote new growth, which is subject to fungus attack. The principal insect pests and fungus diseases are discussed and recommendations made for their control.

2464. SHEFFIELD, F. M. L. **The Clove trees of the Seychelles.** *E. Afr. agric. J.* 16 (1), 1950 (3–8). 10 refs.

When the symptoms of sudden-death disease of Cloves were being studied in Zanzibar, a number of characters not typical of the average dicotyledon (mottling of the leaves, secondary thickening in the internal phloem, necrosis in both internal and external phloem, very narrow and delicate cambium, very unevenly thickened and lignified xylem, frequent tyloses, and a discoloration of the root phloem) were observed. These conditions were found in both diseased and apparently healthy trees, and in order to determine whether they have any diagnostic value for sudden-death disease, the author made a study of Clove trees in the Seychelles, where the disease is unknown. All the above-mentioned characters were found in trees from several different areas of the Seychelles and it is therefore evident that none of them can be regarded as diagnostic of sudden-death disease.

The history of the introduction, cultivation, utilization, and abandonment of cultivation of the Clove in the Seychelles is described in some detail. The practice of lopping the trees for the purpose of manufacturing leaf oil was probably largely responsible for the great diminution in numbers of the species, since the lopping was carried out in a brutal and excessive manner. But some old, misshapen, but apparently perfectly healthy lopped trees, indicate that lopping as such is not fatal, though it is believed in Zanzibar that pruning would kill Cloves. In Zanzibar, too, it is held that Clove wood is too hard to work without machinery and in fact it never is used, whereas it is used for both house-building and making furniture in Seychelles where no machinery is available.

5. MENSURATION. INCREMENT. YIELD

2465. WILHELMI, T. Fluchtlinienmethoden bei Aufstellung forstlicher Hilfstabellen. **[Alinement-chart methods in the construction of auxiliary forest mensurational tables.]** *Mitt. Bundesanst. Forst- u. Holzw.* No. 15, 1950. pp. 6 + [6]. 7 refs. [G.e.f.]

Describes for German readers the development of alinement-chart methods, especially in the U.S.A., and illustrates procedure by an American example of the method of constructing a stand table. Stresses also the value of alinement charts as pure multiplication tables, giving as an example an alinement chart for Huber's volume formula. [Cf. *For. Abstr.* 12 (No. 2506).]

52. MEASUREMENT OF TREES AND TIMBER

See also *For. Abstr.* 12 (No. 2521).

52.2. *Height. Length*

2466. MESCHINI, A. Calcolo dell'altezza media di un complesso di alberi. **[Calculation of the mean height of a stand of trees.]** *Ital. for. mont.* 5 (6), 1950 (230–2). [It.f.e.]

Explains a simple method of calculating the mean height of N trees in a normal even-aged stand without the necessity of taking into consideration diameter or basal area. The ascertained heights of the N trees are arranged in an increasing series, and the height occupying the $\frac{7}{10}$ N position in the series is the mean height. Comparison of this method with those using the formulae of Lorey and Baur was made on 70 sample plots of *Abies alba* and 27 of *Fagus sylvatica*, all in normal even-aged high forest. A high degree of agreement (90·32% for Fir and 92·59% for Beech) was found between the empirical method and Lorey's; Baur's method gave consistently lower values.

52.4. *Measurement of Volume*

See also *For. Abstr.* 12 (Nos. 2505, 2507, 2530, 2532).

2467. PERRY, T. D. **How veneer logs are measured.** *Wood Prod.* 55 (8), 1950 (31–4).

A description of the Doyle-Scribner log scale.

2468. SCHNUR, G. L., and LANE, R. D. **Aids for computing tree volumes in**

Illinois. *Tech. Pap. Cent. St. For. Exp. Sta.* No. 115, 1950. pp. 26. 9 refs.

In a test of the applicability to Illinois trees of cumulative volume tallies and form-class tables [cf. *For. Abstr.* 12 (No. 800)], species correction factors, average form classes, bark ratios for converting the volume of rough wood to a peeled wood basis, bark thicknesses for ease in determining form classes of standing trees, and local cu. ft. volume tables for pole-sized trees, have been developed. These factors and tables should be applicable to similar forests in states adjacent to Illinois. General recommendations and instructions for their use are given.

2469. HARRIS, J. M. **A generalised mathematical formula for constructing volume tables.** *N.Z.J. For.* 6 (1), 1949 (60–3).

The formula used is:—

$$V = \left[D + \frac{\sqrt{D}}{C_1}\right]^2 \left[\frac{H}{C_2} \pm \frac{H^2}{C_3}\right]$$

where V = volume, D = d.b.h. over bark, H = height and C_1, C_2 and C_3 are constants. The term $\sqrt{D}$ is included in the first bracket in order to allow for bark volume. From the basic data rough curves are drawn from which one d.b.h. and one height-class curve are selected as sufficiently accurate for mathematical analysis (described). It is believed that all the curve characteristics that are exhibited in volume tables can be reproduced by this generalized formula, which does not attempt to interpret mathematically tree form or other specific features, but relies on alterations of the 3 constants to get the curves characteristic of different species and localities. Volume tables already constructed by this method have proved to be well within the limits of accuracy required by the New Zealand Forest Service.

2470. CANTIANI, M. Tavola cormometrica dell'abete bianco dell'Alto Molise. **[Volume table of *Abies alba* from the Alto Molise [Apennines].]** *Ital. for. mont.* 5 (6), 1950 (211–3). [It.f.g.]

2471. CLAUSER, F. Tavola cormometrica per l'abetina di Vallombrosa. **[Volume table for the Fir [*Abies alba*] wood of Vallombrosa.]** *Ital. for. mont.* 5 (5), 1950 (195–6). [It.]

2472. HUMMEL, F. C., IRVINE, T. W., and JEFFERS, J. **General volume tables for European Larch in Great Britain.** *For. Rec. For. Comm., Lond.* No. 9, 1950. pp. 24. 2 refs. Price 9*d.*

2473. HUMMEL, F. C., IRVINE, T. W., and JEFFERS, J. **General volume tables for Scots Pine in Great Britain.** *For. Rec. For. Comm., Lond.* No. 8, 1950. pp. 27. 2 refs. Price 9*d.*

2474. HASEL, A. A. **Board-foot and cubic-foot volume tables for second-growth Redwood [*Sequoia sempervirens*].** *For. Res. Notes Calif. For. Range Exp. Sta.* No. 66, 1950. pp. 14.

2475. HORNIBROOK, E. M., LARSON, R. W., AKKEREN, J. J. VAN, and HASEL, A. A. **Board-foot and cubic-foot volume tables for some California hardwoods.** *For. Res. Notes Calif. For. Range Exp. Sta.* No. 67, 1950. pp. 31.

Quercus kelloggii, Q. garryana, Arbutus menziesii and *Lithocarpus densiflora.*

2476. HUMMEL, F. C., and WATERS, W. T. **General volume table for Beech in Great Britain.** *For. Rec. For. Comm., Lond.* No. 6, 1950. pp. 11. Price 4*d.*

2477. ANTONIOTTI, G. B. Tavola dendrometrica del cerro del Molise cresciuto in fustaia coetanea. **[Volume table for *Quercus cerris* from Molise grown in even-aged stands.]** *Ital. for. mont.* 5 (5), 1950 (191–4). [It.f.g.]

Gives total volume and also assortments of sleepers, cordwood and faggots, for 5-cm. classes (d.b.h. 10–60 cm.) based on 778 trees.

2478. HUMMEL, F. C., and WATERS, W. T. **General volume table for Oak in Great Britain.** *For. Rec. For. Comm., Lond.* No. 5, 1950. pp. 11.

2479. GEVORKIANTZ, S. R., and GUILKEY, P. C. **Lake States pulpwood cruisers table.** *Tech. Note Lake St. For. Exp. Sta.* No. 338, 1950. pp. 2.

2480. **Luquillo forest volume estimated from basal area.** *Carib. For.* 11 (2), 1950 (73, 96–7). [E.Span.] (*Rep. U.S. trop. For. Exp. Sta.* 10 [1949?]).

The recent construction of volume tables for this region has made is possible to express density of stocking in terms other than basal

area. The relationship of basal area to volume per acre in the Luquillo forest was found to be nearly linear for both the tabonuco and the colorado types, and not greatly affected by stand history.

2481. JOLLY, N. W. **The volume line theory in relation to the measurement of the standing volume of a forest (with particular reference to *Pinus radiata*).** Woods and Forests Department, S. Australia. [1950?]. pp. 37 + 10 gphs.

Discusses the use of the 'volume line' (volume plotted against basal area) and its advantages over the more usual curve of volume plotted against diameter, in the calculation of stand volume by the mean-tree method. Tests so far carried out in *Pinus radiata* plantations in S. Australia indicate that the volume-line theory can be applied to comparatively densely stocked forests, but there is as yet no indication that the same is true for older crops heavily opened up by crown thinnings made to stimulate diameter increment.

2482. SOEST, J. VAN. Principiële vraagstukken bij proefperken. 1. Gewone randbomen. [**The main problems in sample plots. 1. Trees on the periphery.**] *Ned. Boschb.-Tijdschr.* 22 (3), 1950 (73–6). [Du.e.] [*Korte Meded. Bosbouwproefsta. T.N.O., Wageningen* No. 6.)

A comparison was made in a sample plot of Japanese Larch between trees on the periphery and in the middle of a stand. The average basal area including the trees on the periphery was about 15% higher than that for the inner trees only. A similar, if less extreme, result was found for another plot bounded on 3 sides by ditches and on the fourth by a narrow track. Results are tabulated.

2483. KEEN, E. A. **The Relascope.** *Emp. For. Rev.* 29 (3), 1950 (253–64 + 2 photos). 3 refs.

After describing the instrument (for the measurement of basal area per acre and individual tree volumes) and its operation [cf. *For. Abstr.* 11 (No. 2337)], the author gives the results of field trials. Although the prototype used suffered from several mechanical defects, it is considered that its accuracy is sufficient to render the instrument of value in general forest management, and, in particular, for the collection of data for working plans. In making basal-area estimates it was found that the count obtained in a single sweep is influenced by the combined effect of personal and instrumental errors. It appears that personal errors may be considerably reduced by practice. These occur in the estimation of breast heights and in the inclusion of doubtful stems on the borderline of visibility. With two observers, one of whom marks doubtful trees as the sweep proceeds, little extra time is required to eliminate these errors almost entirely. It became evident during the field work that, for a person with somewhat defective eyesight, continuous use of the instrument over a period of several hours causes strain which, if two observers are present, is at once revealed in the gross inconsistencies of their counts from the same point. Other considerations apart, therefore, it is preferable that enumerations be duplicated. Another factor involved is a sampling error arising from stocking variation within plots. Analysis of data shows that it is these stocking variations that are mainly responsible for the difference between the individual Relascope estimates in each plot.

Volume trials with the instrument were carried out on 41 coniferous trees and 9 Poplars. It was found that the Relascope volume estimates were negatively biased to the extent of 7–9%, and that superimposed on the bias was a random variation with a variation coefficient of *ca.* 12%. Since the variation coefficient of individual tree volumes from the general volume tables for Scots Pine and European Larch is between 15 and 20%, the practical value of the instrument would appear to hinge upon the possible variation of the bias with tree size, species, and observer. The negative bias shown by the present data is attributed mainly to the present design of the instrument. Suggestions for remedying this have been made to Bitterlich, who is incorporating them in a new model.

2484. YATES, F. **Sampling methods for censuses and surveys.** Charles Griffin & Co. Ltd., London. 1949. pp. xiv + 318. 13 pages of refs. Price 24*s*.

Written primarily for those who have little or no training in mathematical statistics, but who have some training or experience in the presentation and handling of statistical data. Mathematical proofs are not included, but an attempt has been made to cover all the modern

developments of sampling theory that are of importance in census and survey work, and to give an adequate discussion of the complexities encountered in their practical application. The various computational procedures have been illustrated, as far as practicable, by numerical examples, mostly with an agricultural background. Among the examples are the following computations from a census of woodlands:—volume of timber, area of woodland from maps, and interpenetrating samples. The bibliography, based on one prepared by the statistical office of the United Nations, contains a section of forestry and land-utilization surveys.

2485. **Planning a national forest inventory.** *FAO For. & For. Prod. Stud.* No. 1, 1950. pp. 88. 42 refs.

This study, carried out by the Forestry and Forest Products Division of FAO, is intended to be of service to those who may be required to plan large-scale forest inventories for the first time. It outlines the principal problems which must be dealt with and suggests a logical sequence for their consideration. It also treats briefly of some of the most recent inventory techniques and discusses their merits and disadvantages. The study assumes a combined use of aerial and ground surveys and some 24 pages are devoted to each, including select bibliographies. Other chapters deal with forest classification, maps and mapping, and the compilation of material recorded in the field.

2486. JOHNSON, F. A. **Estimating forest areas and volumes for large tracts.** *J. For.* 48 (8), 1950 (340–2). 5 refs.

Describes a method for cruising large tracts that has been used in the Pacific Northwest by the Forest Survey of the U.S. Forest Service, other public agencies and some private agencies. The method combines air photography and ground sampling. [Cf. *For. Abstr.* 11 (No. 776).]

2487. MCKENZIE, W. **Methods of stock-taking for hardwood forests which might be applicable to a general survey of Australian hardwood resources.** *Aust. For.* 13 (2), 1949 (1950), (97–107). 13 refs.

A review of American methods of combined photogrammetric and ground survey.

2488. LINNAMIES, O. **Reikäkorttijärjestelmä metsänarvioimisen apuna. [The punched-card system in forest survey work.]** *Metsät. Aikak.* 1950 (1), (6–11). [Fi.e.]

Account of the punched-card system with particular reference to its use in the second National Forest Survey and in two subsequent surveys of private estates.

53. SOLID CONTENTS OF STACKED MATERIALS

2489. PARKER, H. A. **Bark thickness of Lodgepole Pine.** *Silv. Leafl. For. Br. Can.* No. 49, 1950. pp. 2.

The bark thickness apparently varies with age and with site. For a given age and diameter class, it is thicker on poor sites than on good ones. For a given site, the change in bark thickness with diameter is slightly greater in the younger (54 years) than in the older (81 years) stand sampled.

54. FACTORS CONNECTED WITH ASSORTMENT

2490. HORNIBROOK, E. M. **Estimating defect in mature and overmature stands of three Rocky Mountain conifers [*Pinus contorta* var. *latifolia*, *Picea engelmanni* and *Abies lasiocarpa*].** *J. For.* 48 (9), 1950 (408–17). 9 refs.

Describes the more important external indications of defect and outlines methods of estimating the amount of defect.

55. AGE

See *For. Abstr.* 12 (Nos. 2014, 2495).

56. INCREMENT

See also *For. Abstr.* 12 (Nos. 1890–4, 1971, 1974–8, 2507).

2491. BOGGESS, W. R., and LORENZ, R. W. **Growth and early thinning of Shortleaf Pine in Southern Illinois.** *For. Note Ill. agric. Exp. Sta.* No. 16, 1950. pp. 2.

2492. SCAMONI, A. Die weitere Entwicklung der Kreuzungen zwischen *Larix europaea* D.C. und *L. leptolepis* Murray in Eberswalde. **[Further development of crosses between *L. europaea* [*decidua*] and *L. leptolepis*.]** *Züchter* 19 (7), 1949 (192–6). 5 refs. [G.] C.G.B.

A report on the progress of the hybrids after 13 years [cf. *For. Abstr.* 4 (91)]. The early vigorous height growth was not maintained and the hybrids were eventually surpassed by *Larix decidua*. Height growth of *L. leptolepis* was less than that of the hybrids but these had poor form.

2493. SCHREVEL, M. De ontwikkeling van Japanse lariks in eikenbezaaiingen. [**The development of Japanese Larch in stands of sown Oak.**] *Ned. Boschb.-Tijdschr.* 21 (5), 1949 (135–6). [Du.]

In 1934, 2 ha. were sown with native Oak and 1 ha. with American Oak, with Japanese Larch planted between the rows at the rate of 400 trees per ha. After 15 years, the stand of native Oak was in good condition throughout, but the American Oak was uneven in growth. Larch planted among native Oaks was noticeably better than that among the American Oaks. A table is given showing the volume of the Larch in the stands—8·804 cu.m. for 277 trees among the native, and 1·776 cu.m. for 243 trees among the American Oaks. The volume of Larch per ha. is 10·87 and 2·17 cu.m., and the average volume per tree is 0·0318 and 0·0073 cu.m. in stands of native and American Oaks respectively. The soil in both areas before planting was of the same good quality and was given the same preparatory treatment, and the difference in growth is attributed to differences in root competition and humus formation between the two species of Oak. [Cf. *For. Abstr.* 12 (No. 1880).]

2494. **Young Mangrove coppice approaches stagnation.** *Carib. For.* 11 (2), 1950 (69–70, 92–3). [E.Span.] (*Rep. U.S. trop. For. Exp. Sta.* 10 [1949?]).

Gives measurements showing the development between 1938 and 1949 of a young coppice stand of *Laguncularia racemosa*, usually considered a quick growing species. In 11 years the increase in diameter averaged only 0·7 in. The density of the stand and marked uniformity of tree size has resulted in great waste of site capacity and intense competition, with consequent adverse effects on diameter growth.

2495. **[Number of years necessary to grow to height of ring count.]** *Rep. B.C. For. Serv. 1949*, 1950 (31).

The number of years necessary to grow to height of ring count was determined for the Lodgepole Pine/Spruce type in a young stand originating naturally after a fire. Lodgepole Pine required 3·2 years to grow 1 ft. and 8·7 years to grow 4·5 ft. Spruce required 4·4 years to reach 1 ft. and 13 years to reach 4·5 ft. Many more trees must be sampled to reach a given degree of accuracy when ring counts are made at breast height than when they are made at 1 ft. Other studies with Douglas Fir, Sitka Spruce and Hemlock, showed less variation at 1 ft. than at 4·5 ft. For this reason, all counts should be made at 1 ft. where possible. Boring trees below 1 ft. is seldom practical.

2496. BURKLE, J. L. **Accuracy of ring counts on increment cores.** *Sth. For. Note Sth. For. Exp. Sta.* No. 67, 1950 (2).

Some 380 cores of different hardwoods (Sweetgum, Cottonwood, Willow, Black Gums and Maples) were gathered and examined by Forest Survey cruising teams, and then re-examined in the laboratory. Results showed that the 10-yr. radial growth of the Black Gums and of Sweetgum was over-estimated by 10 and 4% respectively, and that that of Maples was underestimated by 6%. In Cottonwood and Willow no significant difference was found between field and laboratory estimates. Errors were due to failure to distinguish all the rings in the Black Gums, and to a lesser extent in Sweetgum, and a tendency to be misled by false rings in the Maples and Willow.

2497. HARWOOD, W. A. **Tree rings and climate through the centuries.** *Weather, London* 2, 1947 (112–20 + 2 photos). E.M.B.

A review of outstanding work in the field of dendrochronology.

2498. WECK, J. Untersuchungen zur Korrelation zwischen Niederschlagsverhältnissen und Baumzuwachs. [**Research on the correlation between precipitation and wood increment.**] *Z. für Weltforstw.* 12 (7/9), 1948 (121–8). [G.e.f.]

In general, a good correlation was obtained between rainfall and basal-area increment of different softwood species, from figures covering a 20-year period at Eberswalde.

2499. FRIESNER, R. C. **Growth-rainfall trend coefficients shown by six species of hardwoods in Brown County, Indiana.**

Butler Univ. bot. Stud. 9 (12/26), 1950 (159–66). 4 refs. A.P.B.

The trend coefficients (i.e. the % of agreements when year-to-year changes in ring growth are compared with year-to-year changes in rainfall for various combinations of months) for *Carya ovata*, *Acer saccharum*, *Liriodendron tulipifera*, *Fraxinus americana* and *Sassafras albidum* were higher when rainfall decreases only were considered than when increases only were considered. With *C. glabra* the reverse was found. When individuals were compared, with the exception of *L. tulipifera* the highest % of agreement was as often with an individual of another species, as with one of the same species.

2500. MILLER, C. W. **The effect of precipitation on annular-ring** [*sic*] **growth in three species of trees from Brown County, Indiana.** *Butler Univ. bot. Stud.* 9 (12/26), 1950 (167–75). 9 refs. A.P.B.

The studies were designed to find what rainfall periods show the highest correlation with growth in *Quercus alba*, *Q. velutina* and *Fraxinus americana*, and what part of the trunk gives the closest growth/rainfall correlation. *F. americana* and *Q. alba* show highest growth/rainfall trend coefficients for the periods May–August and June–August; *Q. velutina* for the periods June–July and June–August. When annual growth of individuals is compared, the highest % of agreement occurs between individuals of the same species, except with *Q. velutina*, which shows higher average agreement with *Q. alba*. In both the latter the upper part of the trunk gives higher growth/rainfall correlation than the lower part. *F. americana* and *Q. alba* show higher growth/rainfall correlation when decreases in rainfall only are considered, except in the case of the latter when 40% or greater rainfall changes are involved. The same is true of *Q. velutina* when the comparison is based upon higher degrees of rainfall change; the reverse when based on lower degrees of rainfall change. *From author's summary.*

2501. SCHOVE, D. J. **Tree rings and summer temperatures, A.D. 1501–1930.** *Repr.* from *Scottish Geographical Magazine, Edinburgh* 66 (1), 1950 (37–42). 20 refs.

Using 5 tree-ring series (3 Pine and 2 Spruce) from Norway and Northern Sweden, the author works out periods of rapid and slow tree growth from 1507–1930 A.D. and deduces corresponding trends of summer temperatures.

2502. BULI, U. Ricerche climatiche sulle Pinete di Ravenna. **[Climatic studies on the Pine woods of Ravenna.]** Centro di Studi per la Geografia fisica, Bologna. 1949. pp. 78. 106 refs. [It.]

The first part of this bulletin describes the methods used and data obtained in a dendrochronological study of some 30 specimens of *Pinus pinea* from Ravenna. For some of these trees (with straight stems and regular form) sections were cut, not horizontally as is usual, but transversely, downwards from the periphery to the centre on a 4-m. butt log. The advantages of this type of section, for ease and accuracy of measuring growth rings are discussed. Measurements were made with a binocular microscope (magnification × 30) having a lens with a micrometric scale of 1 cm. divided into fiftieths. The immediate object of the study was to determine the degree of correlation between increment and solar activity, making use of meteorological data from the station at Forlì. The author emphasizes the various other factors that may interfere with such a correlation.

It was observed that trees growing on the edge of the wood were oval in section, with their longer diameter oriented towards the light, and that this asymmetry was caused by the greater width of the growth rings on the sunny side of the tree. The author therefore decided to use the difference between the width of growth ring in the two radii of the longer diameter of such a tree as an index of increment due exclusively to insolation. This factor, which he calls *incremento meristematico direzionale* (*i.m.d.*) was measured on several trees and plotted against the insolation data which are available from 1753, and also against figures for absolute minimum and maximum winter temperatures for the same period. There was found to be an undoubted correlation between *i.m.d.* and insolation, which is, however, affected by winter temperatures. The importance of analysing growth curves into different periods (i.e. 5½, 11, 22 etc. years) is stressed, and growth data for conifers from different parts of Europe are analysed into 11-year periods and represented in a series of curves.

57. DEVELOPMENT AND STRUCTURE OF STANDS. YIELD

See also *For. Abstr.* 12 (Nos. 1880, 1906, 1971).

2503. **Yield tables for *Acacia mollissima*.** *Indian For. Leafl.* No. 117, 1950. pp. 7.

Translation into English and conversion into Indian weights and measures of tables constructed by Wolff von Wülfing. [Cf. *For. Abstr.* 11 (No. 2362).]

2504. SCHOBER, R. Die Lärche: eine ertragskundlich - biologische Untersuchung. **[Larch: an investigation of growth, yield and biology.]** M. und H. Schaper, Hannover. 1949. pp. 285 + 79 + 12 plates. 82 refs. [G.] Price *DM*20 [£2. 0*s*. 0*d*.]

A monograph on Larch (almost entirely *Larix decidua*) plantations in N.W. Germany, outside the natural range of the species, under the main headings: I—Objects of the investigation; previous investigations. II—Region and material studied. III—Observations on site requirements and silvicultural behaviour of Larch, including special sections on Larch canker and butt rot. IV—Increment and yield, with sections on pure stands (including a new yield table), mixed stands and stands managed for light increment, yield by assortments, results from German Larch trial plots, and excentricity of stem section.

Some general conclusions for the region are as follows:—Properly treated, Larch is capable of high yields, especially in mixed stands. Climatically, it has a wide tolerance of N.W. German conditions, though certain microclimates, e.g. humid sites in narrow valleys, and very frosty sites, are unsuitable. Physical soil conditions are of paramount importance: Larch must have adequate but not stagnant moisture in the soil at all times. The soil should be deep, loamy and reasonably rich in nutrients. Given such conditions, its pH tolerance is very wide. As an extreme light-demander, Larch will not stand lateral crown suppression. Its crown length should always be at least $\frac{1}{3}$ and preferably $\frac{1}{10}$, of the total stem length. Pure plantations are justified on very good sites if protected from deer and underplanted with Beech at 30–40 years of age. Even-aged mixtures with Norway Spruce or Silver Fir should particularly be avoided. The best form of mixture appears to be by pure groups or clumps with Beech, Scots Pine or Oak. It is important to bring in the Larch early and at a wide (2-m.) spacing to avoid suppression. Such mixtures must be planned: it is useless to employ Larch to fill gaps in regeneration of other species if those gaps are due to poor soil. Thinnings must begin early and must be heavy enough to keep the crowns free, though during the period of greatest canker risk (20–40 years of age) enough trees should be retained to replace canker losses. Canker data show that all the younger stands contain cankered trees, but the incidence of attack is generally sufficiently low to ensure a sound final crop. Canker is least frequent in the highest quality classes, in vigorous dominant trees, and in mixed stands. The canker resistance of different provenances needs further study, but the best provenance, when found, must still be given first-rate sites and proper silvicultural treatment.

The total volume yield of pure Larch roughly equals that of Scots Pine, and so does its yield by assortments. On the best sites, however, it produces more large timber and gives a higher financial yield. Its increment curve has the most rapid rise in youth of any of the chief German species, and with moderate thinning it gives the highest intermediate yields up to middle age. Mixed stands with Larch in the upper storey and hardwoods chiefly as understorey, considerably surpass pure Larch in yield. These and other conclusions are supported in detail with many tables and graphs.

2505. ZIMMERLE, H. Beiträge zur Biologie der Fichte in Württemberg. **[Contributions to the biology of Norway Spruce in Württemberg.]** *Mitt. württemb. forstl. Vers-Anst.* No. 8, 1949. pp. 143. 42 refs. [G.]

Mensurational studies by the Württemberg Forest Research Institute, comprising: (1) A new yield table, compiled in 1943, together with an analysis of the basic data, auxiliary data for the more important tree classes, and a comparison with other Spruce yield tables. (2) Studies on stem form. (3) A new *Derbholz* (timber down to 7 cm. top diameter) volume table, together with a table of *Derbholz* form factors.

2506. WILHELMI, T. Über die Konstruktion Britisch-Indischer forstlicher Tafeln. Wachstumsverlauf und Massenproduktion von gleichaltrigen Salbeständen gegenüber Fichte

und Buche. **[The construction of British-Indian forest mensurational tables. Development and volume production of even-aged Sal stands as compared with Norway Spruce and Beech.]** *Mitt. Bundesanst. Forst- u. Holzw.* No. 16, 1950. pp. 20 + [7]. 23 refs. [G.e.f.]

[Cf. *For. Abstr.* 12 (No. 2465).] The 3 parts of this paper give:—I. Explanations for German readers of the terminology used in British-Indian mensurational tables. II. An account of the construction of volume, yield, and stand tables in British India, with notes on the use of alinement charts for stand-table construction. III. A comparison of yield-table data for first-quality Sal (*Shorea robusta*) in the United Provinces (Smythies, 1923) with data for Spruce (*Picea abies*) and Beech (*Fagus sylvatica*) in Germany (Wiedemann). Compared with these, Sal shows far fewer trees per unit area but considerably greater mean heights and mean diameters. The volume increment of Beech up to 100 years is below that of Sal, while that of Spruce surpasses Sal from 60 years onwards. Despite this, Sal shows a considerably higher production of dry wood substance per unit area throughout the period. If, however, comparison is based on Weck's proposed 'absolute height quality' (the mean height of an even-aged stand at 100 years), the ratio of absolute height quality to dry wood substance produced up to 100 years turns out to be almost the same in Sal and Beech, and lower in Spruce. If Sal is a typical example, the yield capacity of tropical stands could not be expected greatly to exceed that of stands in Germany, the rapid development of the trees in tropical stands being balanced by the much smaller number of trees per unit area.

2507. HUMMEL, F. C. **Studies of growth.** *Rep. For. Res. For. Comm., Lond. 1948–9*, 1950 (6–12).

Among the subjects dealt with in this report are the following:—

Sample-plot procedure. The possibility of using an optical instrument for obtaining diameter measurements high up a tree, without having to climb it, has received further attention. Preliminary trials with the prototype of a range-finder, having an 8-in. base and constructed for surveying purposes, have proved very successful. At a range of 44 yd. (40 m.), diameters can be determined to the nearest 10 in. The instrument weighs only a few pounds and has the great advantage over the type of dendrometer hitherto used, that it measures both range (distance) and diameter.

Volume tables. The preliminary tables for the Census of Woodlands [cf. *For. Abstr.* 11 (No. 2338)] were prepared graphically, but the final tables will be done mathematically.

Thinning yields. Various methods of obtaining an estimate of the standing crop of $\frac{1}{10}$-acre plots were tried. The best method found was to select 3–5 thinnings with g.b.h. equal to, or at least near, the mean g.b.h. of the crop, and to multiply the average volume of these trees by the number of trees in the plot. When the thinnings are all too small to provide trees of the right girth, a reasonably satisfactory estimate (which, however, tends to be low) may be obtained by taking the 3 largest thinnings available and applying the formula:—

$$\text{Volume of crop} = \frac{\text{Volume of 3 largest thinnings} \times \text{basal area of crop}}{\text{Basal area of 3 largest thinnings.}}$$

The increment of broadleaved species in Great Britain. Examination of 1,500 stems has revealed the following data:—(1) At 100 years of age, average volume of Elm is 75, of Beech and Sycamore 50, and of Oak and Ash about 35 cu. ft. [¼ g.o.b., stem only to 6 in. o.b. diameter]. (2) Differences between species in the rate of growth start at an early age, but the periodic annual increment % at any given age above 30 years is practically the same in the above 5 species, though they differ considerably from one another in actual rate of growth in terms of cu. ft. per annum. (3) There appears to be no dropping off in c.a.i. in any of these species before 150–170 years, and in some trees there is none before 190 years. The increment of a stand drops off earlier, owing to the gradual reduction in the number of stems. (4) The fastest growth records for Oak and Ash come from East England, and for Elm and Beech from the South. Average rate of growth in all broadleaved species appears to be less in Scotland than in England.

2508. CHRISTIE, J. M. **Three Sycamore sample plots in South-East England.** *Quart. J. For.* 44 (4), 1950 (214–6).

Sample-plot data on the growth of *Acer pseudoplatanus* in Hampshire and Sussex. Both plantations and natural stands show

growth comparable to that of Sycamore in the Pennines. [Cf. *For. Abstr.* 11 (No. 1713).]

2509. GEVORKIANTZ, S. R., and OLSEN, L. P. **Growth and yield of upland Balsam Fir in the Lake States.** *Sta. Pap. Lake St. For. Exp. Sta.* No. 22, 1950. pp. 24.

2510. ARDENNE, M. **Growth of second growth Red and White Pine in south-eastern Ontario.** *Res. Rep. Ont. Dep. Lds. For.* No. 18, 1950. pp. 13 + ii + 10 gphs., 7 tbls.

Growth in young White and Red Pine stands was studied by increment borings and from plot measurements in fairly well stocked stands, in and near Algonquin Park. The results, which are shown in graphs and tables, are used as a basis for estimating future yields. The following conclusions are drawn: (1) Growth per acre reaches its maximum at *ca.* 100 years for Red Pine and between 120 and 150 years for White Pine. (2) White Pine overtakes Red Pine in height between 60 and 70 years. (3) In young stands, the largest-diameter classes are of great importance in future volume production; of the 6 highest inch classes, the upper 3 are 3½ times as valuable as the lower 3 in terms of expected bd. ft. volume at 100 years. (4) Average crown width for dominant trees ranges from 8 to 22 ft. for trees 6–16 in. in d.b.h., and increases about 2·5 ft. for each 2 in. in diameter.

2511. BRINKMAN, K. A., and KRAJICEK, J. E. **Growth of a White Pine plantation in Iowa.** *Sta. Notes Cent. St. For. Exp. Sta.* No. 61, 1950. pp. 2.

Growth of an unmanaged 50-year-old stand was determined by taking increment cores from every 25th tree. Basal-area growth by 10-year periods was computed for each diameter class. Although the average annual increase in basal area was 5·37 sq. ft./acre the maximum growth occurred in the decade when the trees were 22–31 years old. During that period the annual growth averaged 8·0 sq. ft./acre. The annual basal-area growth has decreased steadily since then. The stand should have been thinned at *ca.* 30–35 years old.

2512. CHAPMAN, H. H. **Methods and results of resurvey in checking 10-year prediction of yield.** *J. For.* 48 (9), 1950 (444–5).

Briefly describes precautions to be taken against over-estimation of growth in making predictions of yield for mixed uneven-aged stands.

2513. **Complexity and heterogeneity of mixed forest complicates research.** *Carib. For.* 11 (2), 1950 (66–8, 89–90). [E.Span.] (*Rep. U.S. trop. For. Exp. Sta.* 10 [1949?].)

Some data from an analysis of forty ¼-acre plots in the Luquillo Division of the Caribbean National Forest. Despite the large number of species present, only 3–4 of them can be expected to occur within any 4 plots taken at random. Only about 10 species would be common to 50% of the plots. These conditions may be typical of mixed forest elsewhere in tropical America. [Cf. *For. Abstr.* 12 (No. 2533).]

2514. **Luquillo Forest contains two thirds of original number of trees.** *Carib. For.* 11 (2), 1950 (72–3, 96–7). [E.Span.] (*Rep. U.S. trop. For. Exp. Sta.* 10 [1949?].)

A table gives a comparison of the constitution of virgin and cut-over stands in the Luquillo Division of the Caribbean National Forest. The % of the original number of trees (in broad diameter classes) was determined for both the tabonuco (lower montane rain forest) and colorado (montane thicket) types of forest. The table demonstrates the heavier depletion of the former, the drain of large trees in both, the diameter stimulus given to released trees, and the increasing proportion of inferior species.

2515. **Broadleaved Mahogany needs thinning by tenth year.** *Carib. For.* 11 (2) 1950 (78, 102). [E.Span.] (*Rep. U.S. trop. For. Exp. Sta.* 10 [1949?].)

Plantations of *Swietenia macrophylla* by their eleventh year had attained 100–115 sq. ft. of basal area (average diam. 4·8 in.) with 850 trees per acre. The condition of the plantation indicates that this species when planted on good sites at 6 ft. spacing should be thinned not later than the tenth year.

6. MANAGEMENT. WORKING PLANS. SURVEYS

2516. KNUCHEL, H. Planung und Kontrolle im Forstbetrieb. **[Planning and management control in the forest enterprise.]** H. R. Sauerländer & Co., Aarau. 1950. pp. 346. 9 pp. of refs. [G.]

A textbook based on the author's courses of lectures at the Zürich School of Forestry, differing from most textbooks on management in its emphasis on selection forestry and its practical point of view. The work is divided into three parts as follows: (1) *Theoretical foundations* (pp. 17–241), covering objects of management, the concept of sustained yield, the production period, 'normal' forest, actual growing stock (including methods of determination), material and financial yields, a review of the classical methods of yield regulation, with a special chapter on the *méthode du contrôle*, and brief notes on the management of coppice, coppice with standards, and pastured forest. (2) *Preparation and control of the working plan* (pp. 242–73). (3) *A practical example* (pp. 274–337) consisting of an excerpt from an actual Swiss working plan. There are copious tables and illustrations throughout the work.

60. GENERAL LAND MANAGEMENT

2517. GORRIE, R. M. **Land management in the Punjab foothills.** Superintendent, Govt. Printing, Lahore. 1941. pp. 78 + xii + 16 photos, 3 dgms., 1 gph. 9 refs.

60.3. *Management of Different Classes of Forest*

See also *For. Abstr.* 12 (No. 1884).

2518. GORRIE, R. M. **Farm forestry in the West Punjab.** *Repr.* from *Brit. Agric. Bull.* 3 (9), 1950 (33–7). 3 refs.

2519. MCCULLEY, R. D. **Management of natural Slash Pine stands in the flat woods of South Georgia and North Florida.** *Circ. U.S. Dep. Agric.* No. 845, 1950. pp. 57. 58 refs.

One of the main problems in managing *Pinus caribaea* stands in the south, is the integration of wood production, resin tapping, and grazing. This circular deals with this question and also with that of controlled burning, which is commonly practised, besides the more strictly silvicultural questions of thinning and regeneration.

2520. BEDNALL, B. H. **State Pine forests in South Australia (with particular reference to the south-east).** *Bull. Wds. For. Dep. S. Aust.* No. 3, 1950. pp. 24.

A brief account of the plantations (mainly *P. radiata*), their management, logging methods, exploitation, etc.

61. SURVEYING. MAPPING

See also *For. Abstr.* 12 (Nos. 2484–8, 2530).

2521. KADAMBI, K. **Unimeter: a versatile field instrument for foresters, surveyors, engineers, and plane-tablers.** *Indian For.* 76 (10), 1950 (408–10 + 3 photos).

Describes (and illustrates) a multi-purpose instrument designed and constructed by the author in 1944 and tested in field trials. The instrument, which is simple and portable, serves the purpose of a Ceylon ghat tracer, Abney level, hypsometer, tangent clinometer, cross staff, and right-angle prism. The method of use for various purposes, including measurement of tree heights, sectional heights, stem diameters, crown spread, crown height etc. are briefly described.

2522. TOMAŠEGOVIĆ, Z. Prilog poznavanju točnosti nitnog planimetra. **[The accuracy of the harp [acre-comb-type] planimeter.]** *Glasn. šumske Pokuse* 9, 1948 (231–40). [Croat.f.]

Tests on 633 plots showed that results came within the margin of permissible error.

2523. STEIGERWALDT, E. F. **Stereotypes for aerial photo interpreters.** *J. For.* 48 (10), 1950 (693–6).

The author urges the value of keeping a set of cards to illustrate the various forest types to be found in a given region. Each card should contain (1) a stereo pair of vertical air photos, (2) a stereo pair of ground photos of the type and (3) data on species composition, trees/acre,

reproduction, net volume/acre, average height and d.b.h. etc. The construction of these cards and their use in photo interpretations are described in some detail.

2524. GAUSSEN, H. Projets pour diverses cartes du monde à 1/1,000,000e: La carte écologique du tapis végétal. [**Projects for various maps of the world on a scale of one-millionth: ecological map of vegetative cover.**] *Repr.* from *Annales agronomiques, Paris* 19, 1949 (78). [F.]

Discusses problems connected with the representation of plant-ecological data on a map of this scale.

63. ROTATION

See also *For. Abstr.* 12 (Nos. 2333–4).

2525. **Exploitable size and age of *Bombax malabaricum*.** *For. Res. India Burma 1946–47*, 1950 (39–43).

The question of exploitable size and age of *B. malabaricum* was studied with the help of some data collected in South Chanda Division and the following tentative conclusions were reached:—The sizes which yield the highest average log outturn appear to be 6 ft. 6 in. girth for good and 4 ft. 6 in. for average sites, and the proper exploitable ages 90–100 and 65–75 years respectively.

64. DESCRIPTION OF SITE. ASSESSMENT OF SITE AND STAND QUALITY

See also *For. Abstr.* 12 (Nos. 2038, 2530).

2526. WOBST, A. Entwurf zu einer Einheits-Bonitierungstafel für die Fichte. [**Proposals for a uniform table for assessing site quality classes of Spruce [*Picea abies*].**] *Z. für Weltforstw.* 12 (7/9), 1948 (128–37). [G.e.f.]

The tables, showing the average height in metres at different ages of 7 classes, are based on yield tables from Norway, Sweden, Germany, Austria and Switzerland.

2527. ANDERSON, M. L. **The selection of tree species: an ecological basis of site classification for conditions found in Great Britain and Ireland.** Oliver and Boyd, Edinburgh. 1950. pp. xiv. + 21 photos. Price 12*s.* 6*d.*

The author's aim in this book was to provide some really objective practical means of distinguishing and classifying plantable site types, which should serve not only as an aid in the choice of the tree species to be grown, but also as a basis upon which a sound silvicultural practice can be built. The first part of the book deals with the study of the planting area and its climatic and topographic features; discusses the need for some basis of site classification; describes the various aids to locality assessment, including vegetation types; and gives a classification of locality units based on vegetation. This is followed by a study of the future stand elements under indigenous, introduced and exotic species; by a consideration of the probable former forest types of the British Isles; by detailed notes on the individual ultimate stand elements under broadleaved trees and conifers respectively; and finally by a tentative classification of tree species on the basis of their demands on the locality. In the second part, the synthetic or deductive process is considered which leads to the final choice on the basis of biological, economic, and special considerations. *From author's introduction.*

2528. TARRANT, R. F. **A relation between topography and Douglas-Fir site quality.** *J. For.* 48 (10), 1950 (723–4).

For the purposes of this study (a soil survey of the Voigt Creek Experimental Forest, Washington), topography was classified by the terms *convex* and *concave*, the former including ridges, hill-tops and upper slopes, and the latter lower slopes, valleys, and basins. Measurements of site quality, available from 25 permanent sample plots uniformly spaced over the forest, gave the average Douglas Fir site index as 139 for Barneston soil and 147 for the Indianola. An analysis of variance showed no real differences between these two average values, but a difference significant below the 5% level was found between the site indexes for concave and convex topography, both when each soil was considered separately and when the data for both soils were combined; concave topography was associated with significantly higher Douglas Fir site quality than convex topography. It is suggested that some soil surveys may require a measure of topographic

conditions besides the fairly broad soil-mapping units now commonly used.

2529. AREND, J. L., and JULANDER, O. **Oak sites in the Arkansas Ozarks.** *Bull. Ark. agric. Exp. Sta.* No. 484, 1948. pp. 42. 7 refs.

In a study of 86 Oak stands, individual soil factors found affecting periodic annual volume growth and site index were the character of the parent-rock material and the depth of soil to the unconsolidated parent material. On deep soils the best Oak growth was measured on soils derived from limestone and the poorest growth on soils derived from shale and sandstone. [Cf. *For. Abstr.* 12 (No. 841).]

65. DESCRIPTION OF GROWING STOCK

See also *For. Abstr.* 12 (Nos. 2480, 2513–4).

2530. **Reports of the West Coast forestry procedures committee on various recommended forest practices and techniques.** Western Forestry and Conservation Association, Portland, Ore. 1950. pp. 57.

The committee was formed in 1945 with the purpose of defining terms and correct procedures for use in the Douglas Fir region of Oregon, Washington, and British Columbia west of the Cascade Range. The following reports are presented by various sub-committees: 'Site classification recommended for various forest types'; 'A tree classification for Douglas Fir for quality cruising, stand structure studies, growth studies etc.' [cf. *For. Abstr.* 11 (No. 198)]; 'Procedure for determining and defining the stocking of lands which are either naturally or artificially forested' [cf. *For. Abstr.* 8 (No. 1031)]; 'Grouping of recorded diameters and ages into classes'; 'Determination of the allowable cut for forests in the Douglas Fir region' (7 refs.); 'Procedure and cost of conducting forest fire protection analyses' (24 refs.); 'Outlines for forest inventories.' The reports can also be obtained separately.

2531. EYRE, F. H., and ZILLGITT, W. M. **Size - class distribution in old - growth northern hardwoods twenty years after [selective] cutting.** *Sta. Pap. Lake St. For. Exp. Sta,* No. 21, 1950. pp. 15 + 4 gphs.

2532. GILL, C. B. **A study of the relationship between the number of trees per acre and dispersion.** *For. Chron.* 26 (3), 1950 (186–96). 5 refs.

Three types of distribution of trees are described. The first, called systematic, is found in plantations. The second, called random, is found where all conditions of seedbed, seed dispersal and seedling survival are homogeneous. The third, named heterogeneous, is found where some or all of these conditions depart from homogeneity. Formulae and graphs are presented, showing the relationship of four variables, i.e. quadrat size, number of trees per acre, % successful quadrats, and heterogeneity of conditions. The mathematical theory is tested against field data collected by the Dominion Forest Service in B.18, the Mixedwood Section of the Boreal Forest. *Author's summary.*

2533. BLACK, G. A., DOBZHANSKY, T., and PAVAN, C. **Some attempts to estimate species diversity and population density of trees in Amazonian forests.** *Bot. Gaz.* 111 (4), 1950 (413–25). 9 refs. O.B.D.

Counts of trees with stems more than 10 (or 20) cm. in diameter were made on three 1-ha. (100 × 100 m.) plots near Belem (Para) and Fefe (Amazonas). On the 3 plots 60, 77 and 79 species were recorded among a count of 564, 423, and 230 individuals respectively. Analysis of the data suggests that probably no more than half the species were encountered which exist in the associations studied. The population densities of many tree species of the Amazonian Hylea are less than 1 individual per ha. *From authors' summary.* [Cf. *For. Abstr.* 12 (No. 2513).]

66. YIELD REGULATION. SUSTAINED YIELD

See also *For. Abstr.* 12 (Nos. 2530, 2549).

2534. WILLIAMS, A. M. JR. **Five years of sustained-yield operation.** *J. For.* 48 (4), 1950 (269–71).

Describes one of several large forest-management demonstrations established jointly by the Tennessee Valley Authority and state forestry divisions. This is owned by a lumber company, who are managing it on a sustained-yield basis.

7. FOREST ECONOMICS, VALUATION, AND FINANCE

See also *For. Abstr.* 12
(Nos. 1734, 1885, 1906, 2087, 2273, 2279, 2282, 2376, 2408).

74. VALUE OF THE STAND. VALUE OF THE FOREST

2535. PLAVŠIĆ, M. O određivanju šumske takse (cijene drveta na panju). **[Estimating stumpage value.]** *Glasn. šumske Pokuse* 9, 1948 (259–91). [Croat.f.]

Outlines a method of estimating stumpage value by dividing annual expenses, including those on capital account, by current annual volume increment, whereby a provisional price per cu.m. of standing timber can be obtained. By comparing this price with average earnings of the worker and the price of essential commodities, it will be obvious whether an increase or decrease in the price of timber should be introduced. Total annual income of the state forests can be calculated by multiplying this price by the total annual increment of the forests. It is suggested that this total should then be distributed successively over the various species, the classes of transport costs incurred (according to the situation of the forests), and finally the different assortments of produce. The stumpage values so obtained would have no general significance outside the domestic market.

8. FOREST ADMINISTRATION

See also *For. Abstr.* 12 (No. 2538).

84. BOOK-KEEPING

2536. **[Accounting principles and system, together with departmental accounts and balance sheets.]** *Rep. N.Z. For. Serv. 1949–50* 1950 (59–60, 88–97).

Departmental accounts and balance sheets for each of the years 1947–50, and specialized accounts for the Rotorua Utilization Branch are presented in a new form.

9. FOREST POLICY

90. GENERAL PRINCIPLES OF FOREST POLICY

See also *For. Abstr.* 12 (Nos. 1675, 1716–9).

2537. PITT, J. **Note for Executive Council. Forestry.** Agricultural Department, Cape St. Mary, Bathurst, Gambia. 1950. pp. 11 + 2.

A plan for forestry drawn up by the Forestry Adviser who has been appointed for 4 years to initiate forestry activities in the colony.

2538. ROBERTSON, W. M. **An economic survey of forestry in Kenya and recommendations regarding a forest commission.** *Emp. For. Rev.* 29 (3), 1950 (227–34).

A review of the Survey recently released by Government for general circulation.

2539. GILMOUR, J. D. **Canadian forest policies are all wrong.** *Repr.* from *Canadian Banker* Autumn, 1949. pp. 19.

2540. FULLERTON, A. W. **Forest policy in the Maritimes.** *Timber of Canada* 10 (12), 1950 (29–31, 58).

A short account of the administration of Crown forest lands in Nova Scotia and New Brunswick.

2541. **Meeting California's wood needs in the future and relative responsibilities and opportunities of Government, industry, and the citizen in forest conservation and management.** *Papers presented at the Annual Meeting of the N. California Section of the Society of American Foresters, San Francisco, 1949*, 1950. pp. 42.

91. SOCIAL AND ECONOMIC INFLUENCE OF THE FOREST. NATIONAL PARKS. RESERVES. FOREST INFLUENCES

91.1. *Rural Preservation. Reserves. National Parks. Plant and Animal Protection*

See also *For. Abstr.* 12 (Nos. 2387–9).

2542. DÖNHOFF, C. GRAF. Beitrag zu einer Systematik der Naturschutzgebiete. **[An attempted classification of nature reserves.]** *Mitt. ZentInst. Forst- u. Holzw.* No. 9, 1949. pp. 18 + [4]. 52 refs. [G.e.]

2543. JONES, A. P. D. **The natural forest inviolate plot, Akure Forest Reserve, Ondo Province, Nigeria.** Nigerian Forest Department. 1948. pp. 33 + profile.

An enumeration and detailed description of the vegetation.

2544. MOSBY, H. S. **Co-operative wildlife management on the Virginia state forests.** *J. For.* 48 (10), 1950 (700–2). 4 refs.

2545. ALDHOUS, S. E. **Some forest-wildlife problems in the Lake States.** *Wisconsin Conservation Bulletin, Madison* 12 (6), 1947 (3–5).

A brief discussion of problems connected with snowshoe hare, white-tailed deer, small rodents and birds, porcupine and beaver.

2546. BUTLER, R. T. **The buying of den trees for raccoon management.** *J. Wildlife Mgmt.* 14 (2), 1950 (244–6). [Conservation Commission of West Virginia, Buckhannon.] B.A.P.

Recommends that den trees to be preserved for raccoons should be bought from logging companies before logging begins. It was found that, although the dens were deserted when logging started, they were re-occupied afterwards.

91.3. *Influence of the Forest on the Environment*

See also *For. Abstr.* 12 (Nos. 1684, 1737–42).

2547. PROTHERO, R. M. **Forestry in water catchment areas [of Great Britain].** *Nature, Lond.* 166 (4223), 1950 (584–5). 1 ref.

Résumé of a symposium in the forestry section of the British Association, 31 Aug. 1950. Papers read by *R. M. Prothero, D. Lloyd, A. T. A. Learmonth* and *A. E. Fordham.*

92. FOREST LAW

See also *For. Abstr.* 12 (Nos. 2266, 2269–70, 2291, 2305, 2308, 2336).

2548. GABROVŠEK, E. Zakoniti predpisi: pregled pravnih predpisov o gozdarstvu izza osvoboditve do pomladi leta 1948. **[Legal prescriptions: a review of legal prescriptions on forestry from the liberation to the spring of 1948.]** *Gozd. Vestn.* 7 (5), 1948 (126–32). [Sloven.]

2549. **Discussions of the Federal sustained yield law and management of the brushlands of Northern California.** *Papers presented at the Annual Meeting of the N. California section of the Society of American Foresters, San Francisco, 1948,* 1949. pp. 40.

94. FOREST OWNERSHIP. CO-OPERATIVES

2550. **State forestry: Finland.** Kirjapaino Oy. Sana, Helsinki. 1949. pp. 22.

2551. KAGIS, I. **Forestry ownership and forestry practice.** *For. Chron.* 26 (3), 1950 (213–20).

Compares the proportions of forest in private and public ownership with average increment and yield, in the principal European countries and in Canada.

2552. GILMOUR, J. D. **Forest ownership and taxation.** *For. Chron.* 26 (3), 1950 (206–12).

Data on ownership and proportions of forest to arable are given for Canada and compared with data for the principal European countries. The author also discusses the Canadian system of forest taxation.

95. FOREST TAXATION

See also *For. Abstr.* 12 (No. 2552).

2553. MAHOOD, I. **Forest taxation in British Columbia.** *For. Chron.* 26 (3), 1950 (197–205)

96. POLICY REGARDING PROTECTION FOREST, DEFORESTATION AND AFFORESTATION

2554. DACANAY, P. **Utilization of wastelands and the economics and development of reforestation in the Philippines.** *Philipp. J. For.* 6 (2), 1950 (199–215 + 7 photos, 1 map).

It was reckoned before the war that 5,203,620 ha., or 17·5% of the total land area of the Philippines had been deforested and converted to wasteland mostly covered with *Imperata*. The figure was much increased during the war. Some account is given of the areas planted before the war (27,000 ha.), and a list of the more important species and their m.a.i. in height and diameter; also a short description of *Cinchona* plantations.

97. POLICY REGARDING THE RELATION OF THE FOREST TO AGRICULTURE, PASTURE, AND INDUSTRY

See also *For. Abstr.* 12 (Nos. 1952, 2517–8, 2547).

2555. PENDLETON, R. L. **Agricultural and forestry potentialities of the tropics.** *Agronomy Journal, Geneva, N.Y.* 42 (3), 1950 (115–23). 27 refs. H.S.B.

Reviews the special difficulties encountered in growing agricultural crops under tropical conditions, discusses the nature of tropical soils and the causes of their degradation, and makes some recommendations as to the most suitable crops and methods, with special reference to the crops.

2556. **Farm woodlot licences.** Department of Lands and Forests, British Columbia Forest Service. 1950. pp. 25.

An amendment to the 'Forest Act' in 1948 makes it possible for farmers to acquire a licence to manage Crown forest land for woodlot purposes; this bulletin expounds the conditions under which such licences are granted. [Cf. *For. Abstr.* 11 (No. 3421).]

FORESTRY THE WORLD OVER

References: 1. *American Nurseryman*, Chicago; 2. *Annual Report of the Forest Department, North Borneo*; 3. *Bois et Forêts des Tropiques*, Paris; 4. *Chemie-Ingenieur-Technik*, Frankfurt a.M; 5. *Crown Colonist*, London; 6. *F.A.O. Press Release*, Washington; 7. *Foreign Commerce Weekly*, Washington; 8. *Forestry Chronicle*, Toronto; 9. *Gozdarski Vestnik*, Ljubljana; 10. *IAI Bulletin*, Prague; 11. *India News*, London; 12. *Italia Agricola*, Rome; 13. *Nature*, London; 14. *Naval Stores Review*, New Orleans; 15. *Nederlandsch Boschbouw-Tijdschrift*, Wageningen; 16. *Revue forestière française*, Paris; 17. *Timber of Canada*, Ottawa; 18. *Timber Trades Journal*, London; 19. *Timberman*, Portland, Ore; 20. *Times*, London; 21. *Trade Circular, Mallinson & Sons Ltd.*, London; 22. *Wood*, Chicago; 23. *Wood*, London; 24. *Wood Notes*, New Haven, Conn.; 25. *Wood Preserving News*, Chicago.

Albania. Experiments are being made in the cultivation of *Aleurites* spp. Both 'Chinese Tung' and 'Japanese Tung' are grown in forest nurseries at agricultural research stations. In one year, 'Chinese Tung' attained a height of 1 m., and 'Japanese Tung' 30 cm. (**10**; Oct. 1950).

Belgium. The tower of Antwerp cathedral, which holds 47 bells, is to be restored. Karri (*Eucalyptus diversicolor*) will be used instead of Oak (**3**; Winter 1950).

British Guiana. A mission consisting of the Conservator of Forests, two representatives of the timber industry and one of the Colonial Development Corporation has visited the U.S.A. to study certain aspects of forestry and the timber trade in that country with a view to promoting the production and marketing of British Guiana timbers (**5**; Nov. 1950).

Burma. The State Timber Extraction Organization of Mandalay has accomplished the formidable task of bringing down from Katha to Mandalay 10,200 Government-owned Teak logs. A convoy of 5 tugs towed the logs, which constituted the largest single consignment ever to reach Mandalay from the forests of Katha, Bhamo, and Myitkyina (**18**; 6.1.51).

Canada. At the 42nd annual meeting of the Canadian Society of Forest Engineers held at Sault Ste. Marie in Oct. 1950, it was agreed to transform the Society into the Canadian Institute of Forestry. The new Institute will operate under Dominion letters patent. It will have a strictly professional membership class, but with additional affiliate and student membership classes (**8**; Dec. 1950).

The new Forest Products Institute held its first meeting at Ottawa, 30-31 Oct. Papers were read on a wide range of subjects including forest products research, sawmills, furniture, condensation control, laminated timbers, softwood, plywood, wood adhesives, synthetic ammonia, essential oils from coniferous foliage, fuel briquettes, seasoning, and fibreboards (**22**; Dec. 1950).

When an appeal was made against an award to a farmer by the Superior Court of the province of Quebec, of $37,286 damages for flooding caused on his land after trees had been felled along the Matane River, a majority decision was reached by three out of five judges of the Appeal Division of the King's Bench for the Province, that 'a proprietor who cuts the trees from his land which forms part of the watershed [*anglicé* catchment] of a river is not responsible in law to riparian owners whose lands are flooded by the increased flow in such river due to the removal of such trees' (**17**; Feb. 1951).

The new portable chippers have stimulated interest in the use of wood for fuel. The Northeastern Wood Utilization Council is co-operating with Canadian leaders in the development of stoves with gravity feed for camp and domestic use. For large boilers, combustion units are now available that are interchangeable for chipped wood, coal, and oil (**24**; Nov. 1950).

FAO. At the present time, Regional Offices exist in Rome (for Europe), Cairo (for the Near East), and Bangkok (for Asia and the Far East). There is a branch office of the Forestry Division in Rio de Janeiro, and a representative of FAO has been assigned to work with the ECLA office at Santiago, Chile. The transfer of FAO Headquarters to Rome will naturally entail the disappearance of the

European Regional Office with effect from 30 April 1951. A small sub-office will probably be maintained at Geneva to serve the Agricultural and Timber Committees of ECE. In spite of its nearness to Rome, it is probable that the Near East Office (which serves an area stretching as far East as Afghanistan and Western Pakistan) will continue to function in Cairo. A new North American regional office will be set up in Washington, and it may be found necessary later to establish a supplementary branch in New York. It is also proposed to establish four sub-regional offices in Latin America, as follows:—(1) at Mexico City (for Central America and the Caribbean), (2) at Bogotá or Caracas (for Gran Colombian sub-region), (3) at Rio de Janeiro (for Eastern S. America) and (4) at Santiago (for Western S. America). Of these, No. (2) may have to be postponed till further funds are available (**6**; 18.9.50).

France. A firm at St. Quentin is using Broom fibres as a textile for the manufacture of conveyor belts. Unlike cotton, it is immune to fungus attack and is very resistant to wet, so that it can be used even under water. Belts made from Broom fibre are being much used in coal mines. [Cf. *For. Abstr.* 12 (No. 2261).] (**16**; Feb. 1951.)

Great Britain. On the advice of the Roads Beautifying Association, and under the provisions of the Town and Country Planning Act, the Anglo-American Oil Company is planting 5,000 trees and 1,000 shrubs to form a screen over a mile long and 50 yds. wide to conceal the oil-refinery buildings at Fawley on Southampton Water. To avoid monotony, bold groups of deciduous trees will be interspersed with evergreens to form a basic screen, and will be underplanted with evergreens or small Beech and Hornbeam, which preserve their leaves during the winter. The main species will be arranged in massive clumps all of one species, overlapping each other and having no rigid outlines. Towards the roadside other deciduous trees will be planted further apart, and wide grassy bays are planned in which ornamental trees and shrubs will be seen in a suitable setting. Evergreen and semi-evergreen Oaks from N. America and the Mediterranean, Japanese Larches and Magnolias, Chinese species of *Sorbus* and *Cotoneaster*, will be planted among native Scots Pine, Silver Birch, Hawthorn and wild Cherry (**20**; 17.1.51).

The pattern of inlay bordering the Prime Minister's conference table (of English Oak) in the new House of Commons is made up of woods from all parts of the British Commonwealth. Each of 57 territorial units has contributed one or more pieces of timber to the inlay, which comprises 259 species of wood. Many of the gifts are unique in this country and the collection and handling of them have provided an intensive course in timber technology and the working properties of rare hardwoods. The chairs which accompany the conference table are also made from woods sent as gifts from the Commonwealth. The Prime Minister's chair is in Iroko sent by St. Helena, and the 6 single chairs are in Newfoundland Birch (**21**; 1950).

Plywood has been used for the construction of the 90 × 40 ft. orchestra canopy in the Concert Hall of the Festival of Britain exhibition on the South Bank of the Thames. It is believed to be the largest acoustic panel ever built in this country and possibly in Europe. The curved, stressed-skin plywood panels are *ca.* 2 in. thick, being formed of two outer skins of plywood with a laminated infilling of dense wood. The panels are veneered on their under-surfaces with carefully selected Sycamore veneers which reach a high standard of decorative finish (**18**; 20.1.51).

The wooden axle of the waterwheel of the water-power-operated smithy at Sticklepath near Okehampton, which is believed to have been in use for nearly 200 years, has had to be replaced. A Yew was selected for the replacement and was shaped at a Plymouth sawmill; it is 16 ft. long and weighs over a ton (**18**; 20.1.51).

Pest Control Ltd., Harston, Cambridge, announce that they will shortly be putting on the market under the trade name of 'Isopestox', a new compound, *bis iso*propyl-amino-fluorophosphine oxide, the oral toxicity of which to rabbits and guinea-pigs is said to be only $\frac{1}{26}$ that of 'Parathion', $\frac{1}{9}$ that of nicotine and rather more than twice that of DDT. It is well translocated by the plant, and thus when applied to the roots by watering the soil it has a selective action against plant-feeding insects. It is completely hydrolysed by the plant within 16 days and can safely be used on crops intended for human consumption (**13**; 17.2.51).

India. The results of research during the year indicate that commercial newsprint can be made of Bamboo and Salai [*Boswellia serrata*] in Madhya Pradesh [formerly Central Provinces], and the Government have appointed a committee under the chairmanship of the Chief Conservator of Forests to report on the availability and supply to the Nepa Mills company, of forest raw material (**11**; 25.11.50).

Preliminary experiments to develop sericulture in Uttar Pradesh [United Provinces] have proved successful in various districts where over 70,000 Mulberry trees were planted last year. The State Government has accordingly drawn up a 5-year plan to extend Mulberry plantations in the State (**11**; 20.1.51).

Italy. A new fibreboard, named Fibrosil, is being manufactured from wood shavings which are coated in glue and hot-pressed. Fibrosil is said to have excellent powers of insulation, mechanical strength, and working qualities (**12**; Sept. 1950).

Jugoslavia. A State commission for land regulation has been set up by the Ministry of Agriculture to classify forest and agricultural land by its suitability for crops and, in particular, to draw a boundary line between forest and pasture (**9**; Feb. 1950).

Netherlands. A working party on the improvement of Scots Pine has been set up. A survey will be made of all stands above 25 years of age, with an estimate of their quality based on stem and crown form (**15**; Aug. 1950).

North Borneo. It is customary to regard Mangrove products as minor products and as of trifling importance compared with timber from inland forests. It is therefore of particular interest to note that direct revenue (in royalties and export duties) in 1949 amounted to only $107,190 from timber from inland forests, compared with $291,427 from Mangrove forest products, while expenditure on the former was much more than proportionately higher (**2**; 1950).

Nyasaland. Mechanization of timber extraction on Mlanje Mountain has continued successfully. Three small forest sawmills are now working in the Southern Province, and a plywood factory is being established by the Acme Tea Chest Co. It is hoped that the full requirements of the Protectorate tea industry will eventually be met (**5**; Nov. 1950).

Siam. Although lac production is confined to limited areas in the northern part of the country, it is of considerable importance to the national economy. Annual exports of sticklac and seedlac total almost 8,000 metric tons and produce more than $4,000,000 in foreign exchange (**7**; 29.1.51).

U.S.A. The Weyerhaeuser Timber Company is experimenting with strangulation in order to obtain heavier crops of Douglas Fir seed. Trees 20-25 years old have had a narrow steel band strapped round the trunk about 4½ in. above the ground, severely restricting the cambium layer. It is thought that the success or failure of the experiment should be shown in the next two seed crops. If the method is successful, it will be used regularly on trees of good form or growth habit (**23**; Jan. 1951).

Two million bd. feet of Alder are to be felled in Oregon during the winter for pulping experiments to be carried out at the research department of Crown Zellerbach Corporation, Portland (**19**; Feb. 1951).

The discovery of growth-regulating properties in several chemicals based on nicotine [cf. *For. Abstr.* 11 (No. 3325)] has led to investigations by the U.S. Dept. of Agriculture. Experiments with bean seedlings showed that treatment resulted in retarded stem growth and the production of stockier plants both in light and in darkness. The most effective of the chemicals tried was 2,4-dichlorobenzyl-nicotinium-chloride (2,4-DNCL) (**1**; 15.11.50).

An outstanding discovery of the second world war was the observation that minute variations in foliage condition and cover were noticeable in colour photographs. The first use was for the detection of camouflage, particularly when cut trees and branches were used. According to recent reports, the scientist who first discovered the phenomenon has carried his investigations further and found

that many valuable minerals in the soil have a measurable effect upon the coloration of plant foliage. Aerial colour photographs taken over mineral-bearing areas, indicate the presence of iron, nickel, cobalt, gold, silver, and many other minerals (**1**; 15.11.50).

Combined tools for bark 'pulling' (freshening the upper part of a face) and acid treatment in resin tapping were shown at the Forest Products Research Society meeting at Valdosta in October. These have been designed to meet the needs of early users of acid who have now arrived at 'pulling' heights. Air pressure is used from a source below that of the actual sprayer unit. A new type of spiral gutter attached by removable bill-poster tacks has also been introduced (**14**; Nov. 1950).

Pressure-treated plywood is being used in U.S.A. in floors of modern streamlined passenger railway carriages. Five-ply, $\frac{1}{2}$-in.-thick plywood is used, bonded together with a water-resistant glue before treatment, and later kiln-dried or air-dried. Sheets are framed and trimmed and holes are drilled at the assembly site (**25**; Dec. 1950).

U.S.S.R. The USSR had, before the war, some 20 large match factories, mostly in Belorussia. As three-quarters of the Aspen stands are situated in northern Russia in Europe, Siberia, or the Far East, it is intended to transfer the match industry gradually to those parts of the USSR. Pre-war production was about 11 million cases (130,000 tons) (**4**; 28.2.50).